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THE HIGH SIERRA MAESTRA.

BY

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Although the Island of Cuba was among the first discoveries of Columbus, and active settlement had even by the middle of the 16th century been pushed to the extent that by 1553 the Indians had been almost totally extirpated, there remains even to-day a surprising proportion of the 43,000 square miles of the island practically a *terra incognita,* unexplored, undescribed, and unmapped, at least in detail.

This is especially true of the rugged mountain range which skirts the southern shore west from Santiago de Cuba, the highest, wildest, and, at the same time, scenically and historically, most romantic section of the island.

Here, in the wild woods are still to be found the signs of the encampments of the patriots of 1868, who struggled unsuccessfully for ten long years to gain their freedom; subsisting on what they could raise on the mountain sides, grassy slopes and coffee trees, run wild, attesting their presence. Here, the most picturesque scenery, with steep slopes, deep cañons, torrential mountain streams, and ever-verdant forest to the very crests of the craggy peaks, the veritable Switzerland of Cuba, is to be found.

Although the writer visited this region entirely with commercial ends in view, and hence was debarred from exploring more than a limited territory, the absence in literature (apparently) of any description, beyond conjectural remarks, of the characteristics of this region may give point even to this necessarily fragmentary result of a four weeks' tramp over this range.

The accompanying map, made with the simplest means—namely, pedometer, pocket compass, and aneroid, checked by triangulation method—can, of course, not make any pretence to accuracy. Indeed, a considerable part of the territory was found practically inaccessible, and could only be sketched from various outlooks, assisted by information from the native guides. Yet, being originally drawn to a scale of 2½ miles to the inch and variously tested, it will be found to give a true account of relationships.

Topography, Geology, and Climate.

The entire mountain range from Cape Cruz east to Cape Maisi (or, according to some, only as far as Guantanamo Bay) bears the name of the Sierra Maestra, with special names applied to some of the eastern parts of the range; but it is proper to differentiate, as the natives do, two sections—namely, the "low" and the "high" Maestra, for they differ essentially, not only in altitude, but topographically, geologically, and probably climatically.

The "low" Maestra runs from the eastern terminus with an average altitude of about 1,800 feet for some 40 miles west from Santiago. The "high" Maestra is announced by a very sudden rise of nearly 2,000 feet at the headwaters of El Jobo, this rise culminating with 3,600 feet in the Cerro del Oro (eastern end of our map), and then the main crest maintains a general level of over 3,000 feet, only the narrow saddles falling now and then below that altitude.

While the "low" Maestra is terraced, squarish in outlines, and while geologically R. T. Hill's description fits it—namely, as "composed of non-calcareous conglomerates and shales of Mesozoic and Eocene age . . . . incrusted on the coastward side to a height of 2,000 feet or more by white limestone," nothing of the kind was found in the "high" Maestra.

Here, indeed, the "master range of the Antilles" lays bare the very backbone of the island in a tremendous uplift of syenites, diorites, diabase, a solid granite mountain. Conglomerates and shale were nowhere seen, and limestone deposits were found in only two very confined spots at the very shore. This refers to some 40 miles of shore-line from the Maso River—our west end of the "low" Sierra—westward.

Those who have given descriptions of this coast range based on observations made from on board of passing steamers have noted the difference in the contours of the mountain peaks from those further east, without suspecting the geological difference as the cause, the purely granitic origin accounting for the bold yet smoother, rounder

outlines, absence of terraces and of plateau-like, broad mountain backs.

Our observations refer, to be sure, only to a limited portion, somewhat less than 1,000 square miles, of the range; but there seems to be no reason for expecting a change of conditions, at least as far as the highest point, El Turquino, and for some distance beyond. This three-peaked mountain does not lie in the main crest, but on a forward spur toward the sea (as located on the map), reaching an altitude variously estimated at 8,300 to 8,600 feet, unquestionably the highest point of the Antilles, although its surroundings are such as to depreciate the impression of its height.

No white man, outside of native hunters and insurgents, seems to have ascended its three conical heads; nor, indeed, has any part of the interior of the high Sierra been visited by naturalist or other explorer, if our native guides—"prácticos," as they proudly called themselves, first-class woodsmen, one a rebel of old, two of the last generation—are to be trusted.

While not impossible with proper outfit, which means smallest requirements on man-back, an exploration of these mountain fastnesses is not without its difficulties.

While the topography is mostly simple, travel is not easy. The main crest, running almost due east and west, is by no means a continuous ridge, but is from time to time—namely, wherever a river takes its rise—interrupted by superior eminences or peaks, a pair of them rising usually to over 4,000 feet, flanking a much-depressed saddle indicating the source of the river. Long, continuous ridges, similarly interrupted by peaks, run from this backbone, more or less due south, to the sea, and north to the plain of the Cauto River basin, dividing the several river basins in most pronounced manner. Secondary ridges branch off from these, themselves, again, divided by lateral ridges into cañons of the third, fourth, etc., order.

A most striking feature is that noted in other mountains of the tropics—namely, the very narrow, often almost knife-edge salients of the ridges, called by the Cubans "cuchillas." Even the main crest exhibits this feature in the saddles. The watershed between the Rio Sevilla to the south and the Baracoa to the north is, for instance, formed by a saddle hardly 20 feet wide, which falls off to both sides with steep descents.

All the cañons at least start with such steep descents, and change, without terraces, into gentler slopes as the main river valley is approached, which may be in half a mile, with a drop of 1,000 feet or more. An area of a thousand acres laid bare by axe and fire of

the insurgents, grown up to grass and lately burnt over again, exhibited most beautifully the skeleton of the mountain structure, with every line clearly shown.

There is rarely a broader mountain back or more extensive sink to be seen on the ridges, and altogether there is little flat land to be found anywhere except near the sea front. Even the coastal plain, which is characteristic of the eastern part of the Sierra Maestra, is here restricted to narrow bits between bold promontories, reaching rarely more than a mile inland, the slopes rising rapidly, sometimes precipitously, from the sea, attaining 1,500 to 2,000 feet in two to four miles, and in fifteen to twenty miles joining the main crest.

The tops of the ridges furnish the best, and altogether smooth travel, wild boar and hunters having improved most of them into trails; indeed, they afford the only practicable means of approach to the interior, the slopes being uncomfortably steep and cut up by innumerable cañons, and the rivers becoming impassable within a short distance from the sea.

Otherwise these rivers are a delight, and a most interesting feature. They are wild, treacherous mountain streams, with magnificently clear and limpid waters, winding between more or less steep—sometimes precipitous—banks, over boulders, rarely over short falls, to the sea. Their waters being cool enough to drink, and just right for a bath, where a pool had formed, the principal hardship of tropical travel was entirely obviated. A rare sight was afforded from a 1,000-foot hill in the basin of the Bayamita River, exhibiting in one panoramic view the whole river-length with all its windings and side cañons, from the very source to the very mouth—a distance, in straight line, of about twenty miles. [See illustration.]

Towards their mouths, a mile or two from shore, the rivers broaden out into deltas, forming more or less broad flood-plains filled with sand, gravel, and rubble; and during the dry season they are mostly lost in the sand and rocks, leaving dry, rocky beds. But during flood-tide—which may come after a single day's rain, as the writer experienced—they spread over their banks and make new channels. In June, when they are in their maximum stages, they are rampant, and effectively stop all traffic.

At the mouth, usually a seawall of ocean-washed rubble forms a barrier against the sea, sometimes leaving a fresh-water pool behind. The customary mangrove swamps occupy much of the lower ocean front, and in two places the rare sight of a sandy beach—rare in Cuba—is to be had.

Only one of the rivers from the high Maestra varies from the

above description—the Sevilla, which carries water all the year to its mouth over a sandy shore. Here, also, is found a harbour—by no means a land-locked but rather an open one—formed by coral reefs. Another, smaller, but safer harbour is found at Chiriviquo, where two projecting promontories, one the island Cayo Gama, add their protection to that of the coral reefs. Otherwise the shore, as far as the Turquino promontory at least, does not even afford safe roadsteads, barring one near the last-mentioned harbour.

The *climate,* while in its general features, of course, more or less like other parts of the island, experiences necessarily modifications such as a high mountain range predicates. While on the north or windward side of the range only one rainy season is recognized, here, to the leeward of the Northeast Trade, and possibly due to the effect of Anti-Trades, it divides itself, just as in Jamaica on the south slopes of the Blue Mountains, into two distinct rainy seasons—namely, a principal, long one, from March to May or June, and a short, secondary one, from the end of September into November. This latter season brings only short daily showers, which, however, lengthen into days when a *temporal,* a northern seawind, adds its quota of moisture. But although it rains occasionally in every month of the year, the front ranges, especially the southern exposures, represent, in their soil conditions and in their flora, dry country. This is natural, since the high mountain range necessarily precipitates a maximum of the humidity of the Trades on the northern slopes and higher peaks, and the lower elevations get less, while evaporation is here greater. Even in the higher altitudes the flora indicates great variations in moisture conditions, according to relative position of the slopes with reference to the rain-shadow of northeastward elevations: unexpectedly xerophytic and mesophytic conditions alternate.

As regards temperature, greater ranges than in the northern part of the island are to be expected, mainly toward lower temperatures. Indeed, the natives complain that their winters are often uncomfortably cold—in their scanty attire. Snow was seen once on El Turquino during the last ten years. While the cooling effect of the Northeastern Trade, which makes the northern shores endurable, is cut off by the mountain range, local currents have as much if not more effect. Mountain winds at night and the sea breeze of the morning moderate even the heat of August and September, the hottest months of the year, so that only the noonday hours may call forth a desire to sit still. With the exception of the humid, hot spring months and the wet-cold October, the climate ought to be the most delightful of any tropical country.

Plant Geography.

The whole mountain range from shore to crest is densely wooded; but he who has preconceived notions of how a tropical forest looks, usually derived from descriptions of humid lowland forests in the zone of continuous rains, will be disappointed.

Were it not for the palms sticking out here and there, the outer aspect, to the layman at least, would hardly convey an idea that he is in the tropics. The general aspect of the wooded slopes is very much like that of our northern deciduous forest, say in August, when the rich light greens have darkened and some trees have begun to assume brown autumn tints and to thin out their foliage.

If the visitor be somewhat of a botanist, he might perceive that the foliage is to a much larger extent than with us made up of pinnatifid leaves, and those of leathery texture. As he lands, if he has not seen them in Florida, the mangrove trees, growing out of the very ocean on the coral reefs, may attract his attention. Here he finds the black mangrove (*Avicennia nitida*), the white mangrove (*Laguncularia racemosa*), and the common mangrove (*Rhizophora Mangle*), with its peculiar tangle of aërial roots with which it is anchored—the main root decaying and these aërial roots furnishing the elastic support which is necessary to withstand the constant washing of the waves—all familiar from our own southern shores.

All the other features of a Florida shore are also present: the sea grape (*Coccoloba uvifera*), joined by the tropico-cosmopolitan shrub (*Hibiscus tiliaceus*), and some palms, perhaps a different species from the Floridian, occupy the drier, sandy parts.

Entering the woods, we do not find a dark, gloomy interior, a jungle of vines and lianas and dense impenetrable underbrush, overtowered by the spreading crowns of giants, as the usual illustrations of tropical forest represent; but the aspect is quite commonplace, and we are at once made to realize that there are, after all, as varied conditions in the tropics as in the temporate zone, produced mainly by variations in moisture conditions.

Here on these dry slopes a pleasant half-shade prevails; and, indeed, when the vertical rays of the noonday sun pour down, a little more shade would be welcome.

There are, to be sure, typical features which even a superficial examination reveals; the larger amount of epiphytic life, especially, the greater frequency of hanging vines and lianas, of bromeliads and orchids, leaves no doubt of tropical conditions.

After some days of closer examination, the other characteristic

features in the make-up of tropical forests, by which it differs from the northern woods, impress themselves.

These are, in the first place—besides the entirely different species, genera and families, which enter into the composition, the absence of gregariousness and the large number of species compassing the forest—two features which are botanically as well as economically of the greatest interest. The gregariousness of our northern species, like the pines, the spruces, the cypress, the oaks, the maples, the beeches, renders their economical exploitation possible; while in the tropic forest some hundred species in more or less sporadic distribution, singly or in small groups, enter into the composition, and hence exploitation of any one becomes expensive. Moreover, trees of commercial size are here comparatively few and far between, so that in this, apparently so dense, virgin forest, rarely as many as ten, and in the average (as determined from 1,200 acres' sampling) not two trees of merchantable size per acre are found. An undergrowth of small trees, mostly Miji and Yaya, the lancewood, forms the bulk of the stand, among which the large ones are unevenly dispersed. And if we consider that out of the hundred and odd species of arborescent flora (probably altogether not less than 150) which constitute the forest of the Sierra Maestra at least forty divide themselves in this small average stand of commercial sizes, we realize the difficulty of securing quantities of any one species. You may travel for many miles before seeing a specimen or a small group of ebony or lignum-vitæ, and then for days and miles you may not see any again.

To the plant-geographer it is of interest to inquire why this sporadic, scattered distribution is characteristic of the tropics—a question which, as far as the writer knows, has never been answered, if at all raised.

There are three principal factors which determine distribution of species and individuals besides the agencies of transportation—namely, temperature, moisture conditions, and light requirements.

Temperature conditions in the tropics are mostly so uniform, and, especially, the range so small, relatively speaking, that this factor plays a most subordinate *rôle* here; while in climates with wide temperature ranges, and especially frost, it becomes highly important. Differences in humidity, especially of soil, occur in the tropics in the same manner as in northern climates, and hence we find it possible to classify species according to their demands for moisture and consequent distribution in dry, moist, and wet situations into xerophil, mesophil, and hydrophil species.

Yet we find this classification, at least on the territory in question,

not so pronounced as it would be in the north. Although there are sets of trees which frequent only either the dry or the moist situations, many more species are ubiquitous, occurring on the dry slopes and ridges, as well as in the humid cañons and bottoms.

We have, then, the factor of light left to account for distribution within a given area. In the north we are accustomed to classify the species into light-needing, and shade-enduring or tolerant, and, unless soil conditions favour in a pronounced manner one species or set of species, as the light-needing pines on the dry sands, the black jack on the barrens, the cypress in the swamps, the rule is that the shade-enduring—spruces, firs, beech, maple, etc.—become gregarious, as is to be expected, while the light-needing occur mostly in small groups or single specimens, survivors of former groups. In the tropics, if there be the same differentiation of species as regards light requirements, the fact of the great intensity of the light would reduce the importance of this factor, like that of temperature, to a minimum. There is enough light for all functions; all have an even chance; shade-endurance ceases to be a strong weapon of defense or aggression; and hence the sporadic, non-gregarious distribution results. This theory would, of course, require further proofs in detail, beyond the scope of this paper.

There is one other factor of economic geography and forest economy which distinguishes the tropics from the northern forest—namely, the fact that most of the woods produced in the former are hard woods, and generally very hard and heavy, fit mainly for fancy finishing and cabinet woods.

The conifers, which form the great staple of our wood consumption, are absent, although on some of the driest peaks, above 1,800 feet in the front range, a pine (*Pinus occidentalis?*), is found, apparently for the first time recorded from Cuba, and of special botanical interest, because, while elsewhere it is generally a "white" pine with five or four needles from a sheath, here it has most frequently three and two needles, like "yellow" pine.

The hardness of the tropical woods, like the mahogany, the lignum-vitæ, the granadillo, ebony, sabicú, majagua, mastic, all of which occur here, fits them only for limited uses; hence they are not at once and directly substitutes in our lumber market. There are, to be sure, some species which produce a soft, light wood; but, so far their character is hardly known; moreover, the supply of them is relatively small; and, since they occur not much less scattered than the fancy cabinet woods, the expense of their exploitation will, except under specially favourable conditions, for a long time to come forbid their profitable marketing.

Among these soft woods there should be mentioned the mighty silk cotton tree (*Ceiba pentandra*), a botanical conundrum, not only on account of its peculiar growth—large buttresses, elliptic shaft form, scanty branching—but of the mystery of its nativity, being found in all tropical countries.

The almácigo or gumbo-limbo of the Bahamas (*Bursera simaruba*), with its peculiar red, papery-flaky bark, is found here in large sizes, and the equally soft-wooded West Indian plum or jobo (*Spondias lutea*), is still more frequent and of larger size.

Altogether the size to which trees grow here, even to the very top of the Maestra, is surprising; and it would appear from the record of botanists as to sizes of Cuban species that they had never seen really virgin growth.

The height of the trees, as is again the rule in much of the tropical forest, is not extraordinary, rarely over 125 feet, but diameters of three and four feet are not rare, and they may exceed six feet. Especially the sabicú (*Pithecolobium arboreum,* not the Sabicu of the Bahamas), the cedar, the mahogany, and the jobo of the valuable species are notable for their size.

The plant-geographer will also find of interest, besides the occurrence of the pine mentioned, the re-discovery of a tree of the Basswood family, the Majagua de Cuba (*Carpodiptera Cubensis*), which, collected by Wright just forty years ago, from the northern side of the range, seems not again to have reached our herbaria. Here it is one of the commonest trees, and, with its bunches of small rose-coloured flowers, becomes a most conspicuous object on the slopes.

A botanical, as well as practically agreeable, surprise were the lemon trees, which are found wild in the shady nooks all over the mountains, producing abundant and perfect fruit, and behaving altogether as if they belonged here. Similarly, wild coffee trees were found, run away from the cafetieras established by the insurgents some thirty years ago, also guavas; and in one location, halfway up to the crest, an abandoned plantation of cacao, coffee, avocado pears, bread fruit, coco palms, bananas, and a number of other fruits showed the adaptation of soil and climate to every kind of tropical products.

Unfortunately for our identifications of the many species, which we could readily distinguish as such, we found that the generally-stated fact of the continuousness of functions in the tropic plant world is only very partially true. While it is true, in a general way, that flowering, fruiting, leaf fall, and budding may take place through-

out the year, it is not true in the sense in which one would be apt to take the statement—namely, as indicating entire absence of periodic movement, of seasonal beginning and cessation of functions. The fallacy was at once brought home to us when we attempted to find fruit under the mango trees which have been planted here, and incurred the derision of the natives—for their fruiting season was over. We did, however, eventually find two fruits; and this is exactly what happens:

While spring is still spring, even here the harbinger of new life, while wet and dry seasons produce rhythmic movement, there are stray individuals, plants or buds—and, perhaps, as in the case of the Majagua, entire species—which disregard the periodicity, and flower or fruit out of season, but the collector who does not want to rely upon the accident of finding these exceptions had better time his visit according to the general plans of nature. Instead of by temperature changes, as with us, the periods are induced by changes in humidity, the hot, rainy season of March to May producing the exuberance of new shoots, flower and foliage, and with many the fruiting is done before September; while the dry winter months see an increasing leaf fall to make room for next season's growth. Whether and to what extent this periodicity is reflected in annual ring growth of trees has never been settled. The pines unquestionably show definite ring growth; but whether one or two rings a year are formed we had no means of determining. In the deciduous trees the rings are difficult to recognize, if at all present. As to the rate of growth, also, nothing is known, so that the recent attempts to determine the age of some historical Ceiba trees from their size appear entirely futile.

The difficulty of obtaining fruit or flower at the season of our visit resulted in our determining accurately only about one-third of the species recognized, another third doubtfully from checklists of the Spanish names which our guides could give us. But as there is no uniformity in the use of these names on the island, they are probably only in a limited number correct. Unfortunately, the last third of unknowable species includes those which, occupying the top of the Sierra, altitudes not elsewhere found on the island, would be of most interest.

Somewhat above the 2,500-foot level the character of the flora changes and a new set of trees makes its appearance. Large trees of barril, of mulato, of retama, of albeyota, with three to four feet diameters, and several smaller, especially melastomaceous species, which form the arborescent flora of the high altitudes, still await identification.

The most striking feature near the top of the Maestra is the remarkable variation from xerophytic to mesophytic plant formations, according to whether the slope lies in the rain shadow of a peak or on the windward side, enjoying the abundant humidity of the rain winds directly. The luxuriant masses of ferns, and grasses and other moisture-loving plants characteristic of the latter situations are lost on the former.

Some of the lower-level species creep up to the very top, or at least varieties (geographical?) of them. But the ubiquitous Miji (*Calyptranthes spec.*), a small tree which forms the undergrowth everywhere else, below the 2,500 foot level, is replaced by other small trees and shrubs, and, in general, the underbrush seems denser on the crest than elsewhere.

Palms—the manacá and the very spiny juta—mixed with tree ferns, occur in larger or smaller groves, and remind us that we are still in the tropics.

Animal Life.

One other feature, which is supposed to pertain to tropical conditions generally—namely, abundant animal life—was found disappointing. As regards mosquitoes, flies, and gnats and other such vermin, their absence, especially in the higher elvations, was, to be sure, a boon; while the continuous sonorous night concert of katydids could have been spared, but otherwise these vast wild woods in the interior, away from the shore, were almost devoid of animal life.

At the base, the loquacious crow (*Corvus gundlachi*), the unharmonious screechings of a long-tailed jay, and a number of shore-birds enliven the stillness, the many lizards and chamæleons, and the curious, uncanny landcrabs, holding largely-attended conventions in the woods, create interest; but in the interior, except for an occasonal wood pigeon, or woodpecker, and a still more occasional brown or blue thrush, or owlet, there is little to disturb the solitude. Yet the never-to-be-forgotten morning song of the most melodious of the tropical birds, the solitaire (*Myiadestes spec.*), a veritable nightingale awakening us, when encamped under the palms on the highest crest, compensated for other deficiencies. In the spring, it is said, millions of wood pigeons and other birds enliven the woods; and this, undoubtedly true, again accentuates the fact that here, as in northern latitudes, life moves, after all, in rhythmical periodicity.

Of game, a black-horned deer exists, and wild boar—a run-wild

razor-back—appears from its many trails and wallows more plentiful than it probably is.

Although still for the most part unprospected, there have been found in the front ranges copper, iron, and even argentiferous deposits. Indeed a magnificent development undertaken by ill-informed American capitalists came only lately to grief by finding out too late that iron-ore in solid granite is an uncertain quantity. Nevertheless, if properly explored and exploited, the mineral wealth, the timber, the agricultural possibilities, added to the scenic beauty, the temperate tropic climate, promise to make this region one of the future paradises and a bonanza to the enterprising.

So far, most of it is a solitude; for the twenty-eight families of native half-breeds living within these thousand square miles have hardly made an impression on the sea front. Civilization there is none; neither school, nor church, nor regular communication appears a necessity for this harmless and childlike, yet quite intelligent folk.

To reach this attractive land of *dolce far niente* or else of toil and trouble, a tug or a sailboat may be hired in Santiago, which, in four hours or two days, as the case may be, lands one in the harbour of Chiriviquo, where a smart little Cuban keeps the store that supplies the region with the few wants which cannot be secured from nature. Or else a horse-back ride of some sixey miles over the camino real, a somewhat dilapidated trail of Spanish times, will do the same.

To the student of tropical botany and plant-geography this comparatively readily accessible and practically virgin field should still yield a rich harvest.

ARCHÆOLOGICAL DISCOVERIES IN CHINESE TURKESTAN.

BY

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The most important archæological work of recent years is probably that of the German expedition which has lately returned from Turfan in Chinese Turkestan. The little basin of Turfan in the midst of the deserts of western China, between Tibet on the south and Siberia on the north, epitomizes the history of Central Asia. It consists chiefly of a desolate plain surrounded by a ring of mountains, some of which rise to a height of 14,000 feet. The most re-

markable fact about the basin is that, though it lies in the very centre of the largest of the continents, the evanescent salt lake which occupies its lowest portion lies three hundred feet below sea-level. Huge, sombre hills of pure wind-blown sand of a deep purplish-gray colour rise to heights of five or six hundred feet a few miles east of the lake; to the west there is a monotonous plain of dying reeds and of rock-salt broken into blocks, which the few native shepherds sometimes use to make stone walls. The basin, as a whole, extends from east to west, with a width of about fifty miles and a length of a hundred. The highest mountains—a dark, barren range—lie to the north, and furnish most of the water which the fifty thousand inhabitants use in watering their fields. Most of the villages—or oases, as they should be called—lie at the foot of a steep little range of bright-red sandstone mountains which rise about two thousand feet and run east and west at the foot of the main northern range and parallel to it. Because of the colour the Chinese call the little range the "Fire Mountains." From this has arisen the fiction, commonly repeated in books of travel and reference, that there is an active volcano in the region.

Turfan is a place of extremes. The higher mountains receive a fair amount of rain and snow; the plain is almost absolutely rainless. In winter the temperature falls far below zero; in summer it often rises to over 110 degrees Fahrenheit in the shade. According to a Chinese after-dinner story, the summer is so hot in Turfan that, after having blown on your rice to cool it, you must ply your chopsticks very fast in order to shove the rice into your mouth before it again becomes so hot as to burn you. The people find great difficulty in getting from the dwindling mountain streams water enough for irrigation. In attempting to utilize every available drop, they have, during the last century, developed a great system of tunnels, which begin deep underground at the foot of the mountains and are constructed with a grade less steep than that of the sloping plain of piedmont gravel. Thus the tunnels finally come to the surface and the water which they carry can be led to fields and orchards. In the past there was no such system of tunnels; only the surface-water was used for irrigation. Nevertheless, the basin was occupied by a population far denser than that of to-day. Ruins and traces of dead vegetation abound everywhere in places which now, even with the help of the tunnels, are so dry that nothing can grow. Most of the ancient houses have disappeared; but there are numerous old forts, and a still greater number of religious structures, chiefly in the form of solid constructions of adobe brick covered with clay reliefs of

Buddha. Among the pious Buddhists of old Turfan every village had its religious edifice and the large towns were crowded with temples, religious schools, and monasteries, which were inhabited by thousands of lamas or monks, as we learn from the accounts of ancient Chinese pilgrims. The largest monasteries, or lamaseries, were located in the narrow, red gorges of the Fire Mountains. There caves were dug in the precipitous faces of lofty alluvial terraces; and the lamas, in long gowns of reddish purple or yellow like those still worn in Tibet, walked back and forth before their cells and temples on narrow platforms, whence they could toss a pebble into the turbid red streams which plunged along the impassable valley bottoms three or four hundred feet below. The scenery, the inaccessible locations, the arrangement of the rooms, and the innumerable paintings of Buddha which completely cover the interior walls remind one irresistibly of the lamaseries, old and new, among the mountains of northern India, where Buddha prayed and fasted and taught his disciples the gentle life which leads to the unconscious bliss of Nirvana.

Apparently, it was through Chinese Turkestan that Buddhism found its way to Japan, where alone the old faith and the old art still maintain a vigorous growth. The Japanese recognize this, and four years ago an expedition, under the lead of one of the chief religious dignitaries of Japan, spent over a year in studying the sites famous in Buddhist history both in northern India and Chinese Turkestan. Their accounts of the journey, full of religious raptures over the past, and of regret for the sad decay of the present, sound strangely like the tales of early pilgrims to Palestine before that land had been turned over to tourists.

Other nations besides Japan are beginning to realize the importance of Chinese Turkestan as a key to certain of the great movements of history. Russian, German, French, English, and American expeditions have all visited the country since 1900. In September, 1904, a small scientific party was despatched to Turfan by order of the German Emperor to carry on the work which had been begun by Professor Albert Grünwedel of the Berlin Ethnological Museum. Dr. A. von Le Coq, the head of the expedition, has lately returned to Berlin, bringing with him about two hundred large cases full of varied archæological treasures, chiefly Buddhist relics dating from the ninth century onward. They include manuscripts on parchment, Chinese paper and leather in at least ten different languages. There are also paintings on hardened plaster, mud, and wood; gilded fragments of Buddhas and saints and native plaques, all in high relief; also samples of the common objects used in everyday life.

Some of the manuscripts are written in Nagari and in two dialects of Brami. They give evidence that an Aryan race migrated from northern India northeastward into Chinese Turkestan. According to Dr. Stein, such a movement took place not far from the beginning of the Christian era, and was probably responsible for the first step in the progress of the Buddhist religion from its home in India through Chinese Turkestan and China to Japan. Other documents are in Tibetan and in the closely-related but little-known Tangut tongue, which is still spoken northeast of Lhasa and southeast of Turfan. It is known that in the eighth century, or thereabout, there was a great movement of Tibetans northward into Chinese Turkestan; and it is probable that the introduction of the languages into Turfan dates from that time. In this connection it is interesting to note that, from evidence collected in Kashmir, and Persia, and in the Lop-Nor and Caspian regions, it appears that from the eighth to the tenth centuries the climate of Central and Western Asia grew more rainy and cool. Thus warm, dry districts like Turfan profited greatly, since the amount of water for irrigation increased and evaporation decreased so that the country was able to support a much larger population. In a cold, wet region like Tibet, on the contrary, the result of lower temperature and of heavier precipitation in the form of snow must have been exactly the opposite. The area where crops could grow and pasture could be found must have diminished and the inhabitants were probably obliged to migrate. Apparently, when some of the people of Tibet were forced to leave their homes by an unfavourable climatic change, they invaded Turfan and other parts of Chinese Turkestan where the same change had produced highly favourable results.

In addition to the Indian and Tibetan languages in which manuscripts were found by Dr. Le Coq at Turfan there were others in Chinese, which manifestly came from the east; in Turkish and the allied Uighur tongue from the northeast, north, and northwest; and in Syriac and Persian from the west. Moreover, there were several manuscripts in a tongue which has not yet been deciphered, though it appears to be a variant of Syriac. The languages from the west were probably brought by Nestorian Christians, who, about 650 A.D., sent out missions and colonies from Syria to Persia, Turkestan, and China. The Christians met with a most tolerant reception among the Chinese, although the number of converts was small. They survived till at least 1300 A.D., when Marco Polo found degenerate colonies of them in various parts of western China. To-day not a trace of Christianity remains.

People of still another race—the nomadic Mongols—played an important part in the history of Turfan. Their record is not found in the shape of temples, paintings, and manuscripts, but in grewsome flesh and blood. When Turfan was renowned for religion, art, and culture—when its great libraries were full of students and its bazaars were thronged with plodding caravans on their way from China to the West—the surrounding mountains were full of Mongol shepherds, fierce tribes of tent-dwellers who despised the very thought of a house. When life grew hard among them because pasturage was scanty or disease ravaged their flocks, they attacked their neighbours in the plain, according to the accounts preserved locally. In one temple, unearthed from the sands that had long covered it, Dr. Le Coq found the dead bodies of several hundred Buddhist monks. The place was crowded with bodies to the very doors. Apparently, the monks had been driven into the temple by the Mongols, and then the doors had been fastened so that escape was impossible, and death from suffocation soon followed. Though the massacre occurred centuries ago, the bodies were in a remarkable state of preservation—almost mummified, as it were, by reason of the extremely dry climate.

The investigations of Dr. Le Coq, together with those now being carried on by Dr. Stein on the southern border of Chinese Turkestan and by a French expedition in Mongolia, mark a new epoch in archæology. The natives of eastern Asia are waking up and becoming a mighty force in the world of to-day; and as they wake, we are beginning to see how great their civilization has been in the past, and how under more favourable physical conditions almost every part of Asia except Siberia has at some time been the seat of a great civilization. We are apt to think of civilization and of the migrations of races as moving steadily in one direction—westward. In Central Asia they have ebbed and flowed. Immigrants from every point of the compass poured into Turfan in the days of its prosperity; and to-day, in the time of its fall, its inhabitants are moving out in all directions.

THE MALASPINA GLACIER.

BY

RALPH S. TARR.

The Malaspina is the largest glacier on the American continent, and probably the largest in the world outside of the Frigid Zone. It lies on the seaward side of Mount St. Elias and other peaks of the St. Elias chain to the southeast of the main mountain. Altogether it has an area of approximately 1,500 square miles, which is more than the area of the State of Rhode Island.

After the purchase ofAlaska, a United States Coast Survey expedition visited this region and reported the presence of an extensive low-lying plateau between the sea and the base of the mountains. On a subsequent visit, later in the season, when the snow had melted from the lower levels, the true nature of this plateau was discovered by the eminent Alaskan explorer, Dr. Dall, who, for the first time announced the existence of a remarkable and extensive ice plateau, to which he gave the name Malaspina in honour of the Spanish explorer who visited this coast over a century ago.

One might wonder that even the snow-covered glacier could have been mistaken for low-lying land. The reason for this mistake was, however, made clear by the later explorations of the late Professor I. C. Russell. In 1890 he made an expedition having for its object the ascent of Mount St. Elias, in the course of which he crossed a part of the Malaspina Glacier, and looked down upon the greater portion of it. Being unsuccessful in his attempt to ascend the mountain, he returned in the following year, crossing the glacier in another part, and, on his retreat, skirting the seaward face for fully two-thirds of its length. Other explorers have crossed the Malaspina at different points, notably Prince Luigi, Duke of the Abruzzi, who, of all the explorers, alone succeeded in ascending Mount St. Elias.

It is from Professor Russell's descriptions that we have gained most of our knowledge of the remarkable ice plateau of the Malaspina Glacier; for he looked at it with the eye of a trained geologist and the keen interest of an expert glacialist. It was my fortune to see the Malaspina Glacier in 1905, when it still retained the characteristics described for it by Russell; and again I saw it in the summer of 1906, when its eastern portion had undergone such a remarkable change as to alter it completely from its former condition. Because of this

sudden and unexpected change in the character of the glacier, which, so far as I know, is unique and without parallel, I propose first of all to describe somewhat fully its condition prior to 1906, then point out what changes have occurred.

The St. Elias chain rises boldly to heights of from 10,000 to 18,000 feet. Almost the entire elevation is visible from the sea-level. The low-lying plateau of the Malaspina Glacier, which reaches a height of not over 2,000 feet, alone interrupts the view. It is one of the grandest mountain panoramas in the world, in whch one can see a sheer elevation of 16,000 feet in a single view.

The grandeur of the St. Elias mountain range is enhanced by the

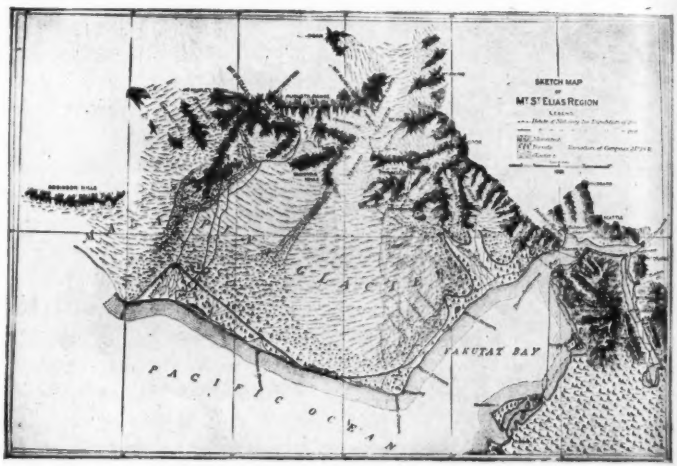

FIG. 1—RUSSELL'S MAP OF MALASPINA GLACIER.

massive snow-cover which mantles the slopes, where not too steep, at all elevations above 3,000 feet. This mountain chain rises on a windward coast, and the winds, warmed and dampened in their passage across the warm waters of the North Pacific, are caused to precipitate much of their vapour content in ascending these great slopes. In consequence of these conditions, the rainfall of this part of the Alaskan coast is exceptionally heavy. At Nuchek, at the mouth of Controller Bay, just northwest of the Malaspina Glacier, the annual rainfall is 190 inches, making it one of the most rainy places in the world outside of the tropical zone.

On the mountains this precipitation occurs in the form of snow; and if it is even approximately as heavy there as at sea-level, the amount

of snow falling annually must be enormous, since one inch of rainfall is equal to about ten inches of snow. We have no rainfall records on the mountain slopes, so that it would not be correct to say that because there are sixteen feet of rain at Nuchek each year, one hundred and sixty feet of snow would fall upon the mountains. At the same time the statement is warranted that, in all probability, the annual snowfall on the seaward face of the St. Elias chain must be measured in scores of feet. Snow falls upon these slopes at all seasons of the year. Again and again, after the July and August storms, I have seen the mountain slopes freshly whitened with the heavy snow that had fallen during the period that the peaks were wrapped in the clouds.

The effect of this heavy snowfall has been to give rise to enormous glaciers. Every mountain valley has its glacier, and the accumulation of ice in the valleys is so great as to give the appearance of a vast sheet of snow and ice with mountain peaks rising out of it. No better description of this condition could be given than that presented by Professor Russell in his account of what lay before him as he looked out from the high slopes of Mount St. Elias, northward over the system of mountains which extend the Saint Elias chain in that direction. Of this view he says: "I expected to see a comparatively low, forested country, stretching far to the north, with lakes and rivers and perhaps some signs of human habitation; but I was entirely mistaken. What met my astonished gaze was a vast snow-covered region, limitless in expanse, through which hundreds and perhaps thousands of barren, angular mountain peaks projected. There was not a stream, not a lake, and not a vestige of vegetation of any kind in sight. A more desolate or more utterly lifeless land one never beheld. Vast, smooth, snow-surfaces, without crevasses stretched away to limitless distances, broken only by jagged and angular mountain peaks."

From these great fields of snow and ice, glaciers descend through the mountain valleys toward the sea. Several of the very largest unite on the seaward base of the Saint Elias mountains to form the great ice plateau of the Malaspina Glacier. Of these, the largest, named from east to west, are the Marvine, Seward, Agassiz and Guyot Glaciers, the latter coming from the western side of St. Elias, the others from the eastern side. In addition there are innumerable minor glaciers contributing to the supply of the great ice plateau. The contributing glaciers are all normal valley glaciers of the type well known in the Alps, but, in the case of the larger ones, many times greater than the largest Alpine glacier. Many of the tribu-

taries, far exceeding in size and grandeur the Aletsch, Mer de Glace, and Rhone Glaciers, bear no names, and, in comparison with their greater neighbours, call for no special mention.

After emerging from their mountain valleys, these glaciers flow out upon a low-lying, moderately-sloping foreland, the exact nature of which is not known, since it is hidden beneath the ice plateau. Over this ice spreads, each glacier expanding to several times the valley width, and, with its expansion, diminishing in velocity. The several tributaries coalesce, forming one complete glacier, which, lying as it does at the foot of the mountains, has been called a *piedmont glacier* (Fig. 1). This is the original type, and, so far as known, the best existing example of piedmont glaciers.

While the Malaspina ice plateau forms a united whole, and from one standpoint possesses individuality, each of its several parts is, nevertheless, dominated by the influence of the valley glacier which supplies its ice. The lines of flow and the surface moraines clearly indicate the areas dominated by the several large, contributing valley glaciers. Because of this influence of the tributaries, the Malaspina consists of three great lobes, the western dominated mainly by the Guyot, the central by the Agassiz, the eastern by the Seward and Marvine glaciers.

Two of these lobes reach the sea, the western terminating along a part of its margin in the ice-cliff of Icy Cape, from which icebergs are discharged into the open Pacific; the eastern barely reaching the ocean, and being bathed by the ocean waves, though without discharging icebergs. This part of the glacier margin, known as Sitkagi Bluffs, is a moraine-covered ice-cliff, with a narrow beach at its base, supplied with rock fragments from the down-sliding of the moraine fragments which veneer the ice.

We have no measurements which permit us to determine the rate of movement of any part of this glacier system. It is evident, however, that the valley glaciers are moving with rapidity, as glacier movement goes, and that the velocity diminishes rapidly toward the sea, in the piedmont expansion of the Malaspina proper, becoming practically stagnant in places around the periphery.

These conditions give rise to some unusual features not common to ordinary glaciers. The mountain valley tributaries are quite like valley glaciers in all respects. They have their snow field supply-ground; their névé area; their valley glacier portion; their lateral and medial moraines; and their areas of crevassing where descending unusual slopes. Outside of the mountains these conditions change entirely. The slow movement of the ice gives little cause

for crevassing, and consequently the surface is comparatively smooth, speaking now of its condition prior to 1906. It is, in fact, so free from areas of marked crevassing, that its surface has served as an

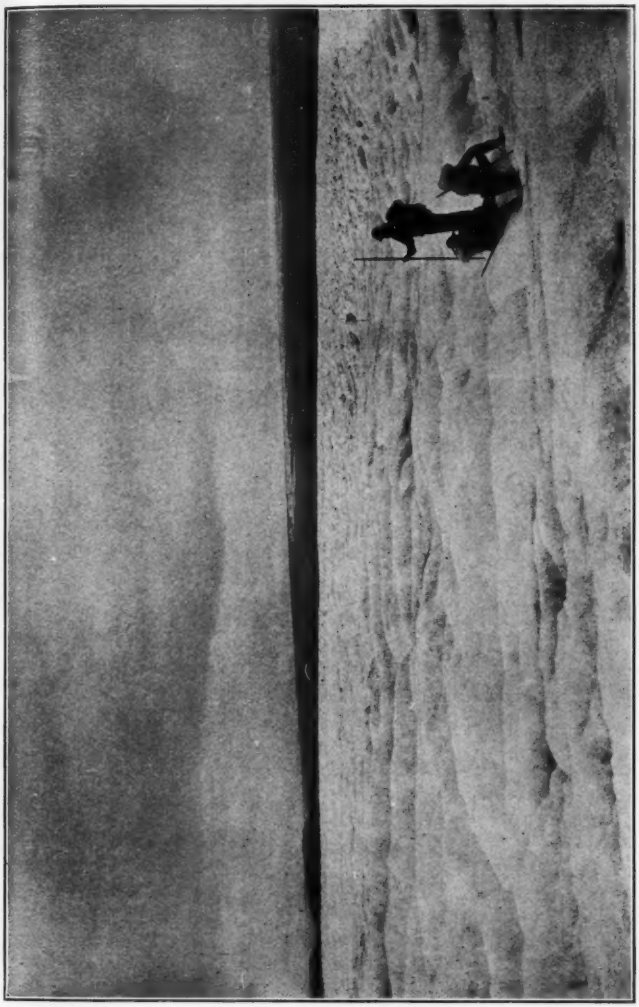

FIG. 2—SURFACE OF CENTRAL PORTION OF MALASPINA GLACIER. (PHOTOGRAPH, 1891, BY I. C. RUSSELL.)

excellent highway for carrying on sleds the outfit of the mountain-climbing parties which have crossed it (Fig. 2).

Since much of the surface of the Malaspina Glacier lies below the level of perpetual snow, it is subjected to great wastage under the influence of sun and rain during the summer season. On one of its tributaries, the Hayden Glacier, I found that the rate of lowering of the glacier surface during the latter part of July and early August amounted to four inches a day. This wastage is accomplished partly by evaporation, partly by the run-off of water which, after a short journey on the ice surface, finds its way into the ice, escaping at the margin through ice tunnels from which emerge violent torrents of great volume, heavily laden with sediment.

Scattered through the ice are numerous fragments of rock, some derived by abrasion along the glacier bottom and sides, but mostly supplied by the down-falling of rock from the mountain slopes, which tower above the valley portions of the glacier system. Some of these rock fragments are caught and borne away in the running waters supplied by the wasting glacier, but the great majority are left behind. The accumulation of these rock fragments causes a concentration at the surface which increases rapidly toward the glacier margin. They are residually concentrated by the wastage of many feet of ice which held them in more or less scattered condition. Thus the rock fragments disseminated through scores, or even hundreds, of feet of ice are assembled together on the glacier surface near its margin.

In consequence of these conditions, the periphery of the Malaspina Glacier is covered by an extensive desert waste of rock debris, over which one may walk with only occasional evidence of the presence of underlying ice (Fig. 3). This morainic blanket protects the ice from sun and rain and thus checks recession of the glacier margin. Where the moraine is thin the retardation of melting is only slight; where thick, the wastage is greatly decreased. Since the cover of moraine is not uniform in thickness, the melting of the underlying ice is irregular, so that the debris-field consists of alternate hummocks and kettles, due to irregular settling, as the ice melts beneath it. Over this morainic waste travel is slow and tedious, and sledding, of course, impossible. The surface is strewn with angular blocks of rock; the way lies up and down hill in whichever direction one may go; the footing is treacherous, for one may at any moment find himself upon slippery ice hidden by a mere film of moraine—or his foot may rest upon a block of rock which is just ready to tumble down the slopes of the morainic hummock.

In several parts of the periphery of the Malaspina Glacier, the movement of the ice is so nearly checked, and wastage is so com-

pletely interfered with by the thick blanket of debris, that the morainic soil is stable enough to permit the growth of vegetation. In some places it is only alder that finds a foothold; elsewhere forests

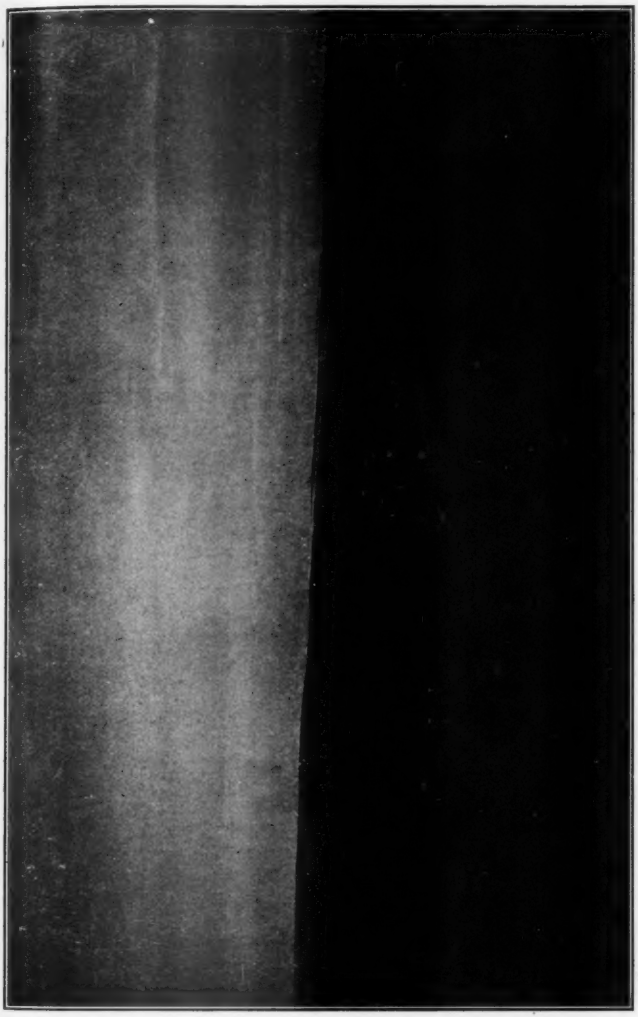

FIG. 3—MORAINE COVERED SURFACE OF MALASPINA GLACIER NEAR POINT MANBY. (PHOTOGRAPH, 1891, BY I. C. RUSSELL.)

of cottonwood have developed; and in some places the spruce forest of the Alaskan coast thrives upon the ice with apparently as much luxuriance as on the land itself (Fig. 4).

This condition of plant-covered ice margin is developed in other neighbouring glaciers; for example, the Lucia and Atrevida Glaciers. In these cases it is wholly impossible, in some portions, to tell exactly where the edge of the glacier actually lies.

In the summer of 1905, I made studies of the glaciers in and around Yakutat Bay, an inlet which pierces the outer portion of the Saint Elias range just southeast of the Malaspina Glacier. In the summer of 1906, I made another journey to this region, intending, if possible, to cross the Malaspina from east to west, following for the first part of the journey the route used by Professor Russell in 1890. The journey which was so easily accomplished by Professor Russell in 1890, and a part of which two members of my party traversed with no difficulty whatsoever in 1905, was in 1906 entirely impossible.

The Marvine Glacier, which supplies the ice of and therefore dominates the extreme eastern part of the Malaspina, including all that which comes down to the shores of Yakutat Bay, was transformed to a sea of crevasses from far up its mountain valley to its very end by the shores of the bay. Professor Russell crossed the Marvine Glacier in 1890 at the point where it comes out of its mountain valley, and he encountered no difficulties worthy of mention. In 1906 this part of the glacier was a labyrinth of crevasses from one side of its valley to the other, a distance of approximately four miles. The surface then bristled with jagged pinnacles, and the ice was cleft by a maze of yawning crevasses. From this point down to the sea, a distance of fifteen miles, the entire eastern portion of the Malaspina Glacier was broken into an impassable condition (Fig. 5). The area of crevassed ice expanded toward the sea until, along the shores of Yakutat Bay, the crevassed ice had a width of seven or eight miles. It was along this seaward margin that Professor Russell travelled on his retreat in 1891, passing over the waste of moraine described above. In 1906 the entire seaward periphery of this part of the glacier was so broken that it would be impossible for a party to travel across it. It was in this section, too, that the Duke of the Abruzzi entered upon the Malaspina Glacier on his way to Mount St. Elias. Where he so easily crossed, one could not now possibly enter upon the Malaspina Glacier without cutting ice steps for almost the entire distance.

The eastern margin of the Malaspina is skirted by a great glacial torrent known as the Kwik River, which flows over a broad alluvial fan that it is rapidly building up with sediment brought from the glacier. We travelled for seven miles up this valley along the very

margin of the broken glacier. Previously this ice margin had been covered by a blanket of morainic waste, and over a large part of the area had supported an alder thicket and cottonwood forest, in which

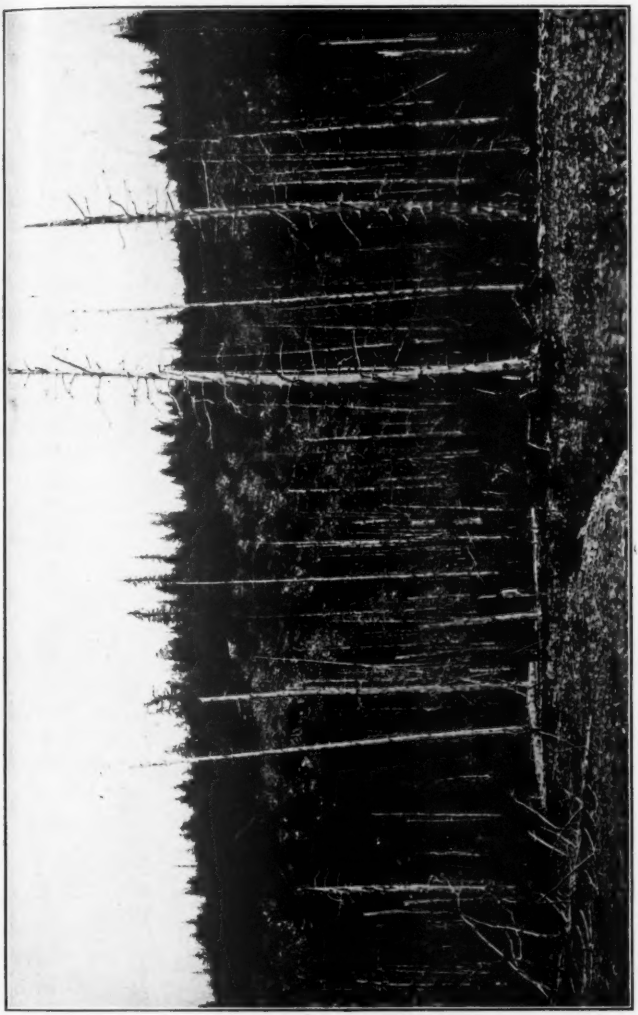

FIG. 4—SOUTHERN MARGIN OF MALASPINA GLACIER, SHOWING FOREST GROWING ON THE GLACIER. (PHOTOGRAPH, 1891, BY I. C. RUSSELL.)

some of the trees were at least 50 years old, indicating a period of stagnation of not less than half a century. The morainic soil had

attained a depth of from ten to fifteen feet, and on it vegetation grew freely. The forward movement of the glacier had broken the ice, pushing the blocks out from beneath the soil and transforming the glacier edge from a moderately sloping margin to a steep, jagged ice-cliff.

Into the crevasses and down the face of this cliff the soil was rapidly falling; and, as the trees were undermined by the removal of the soil from around their roots, they, too, went crashing into the crevasses and down the front of the ice. As we passed along the margin we heard and saw the falling of innumerable trees (Fig. 6). All the trees, whether fallen or standing, had fully developed their foliage, demonstrating conclusively that the changes by which they were being destroyed had occurred entirely within the growing season of 1906. The ice itself was cracking, grinding and falling as we passed along its margin, proving that the advance was even then in progress.

Long blanketed by its soil-cover, the ice platform had been almost completely protected from melting. Now, however, the great rents had opened it to the air and it was melting with great rapidity. The soil, washing down over the broken ice blocks, so discoloured them as to give them the appearance of rock; and in many places the steep, broken ice-cliff, with trees growing upon it, had the appearance of a frost-riven precipice in the mountains of New England or the Adirondacks. By this rapid melting, water was being supplied in great quantities; new streams had developed; and, heavily burdened with sediment supplied by the downsliding morainic soil, the streams were building extensive alluvial fans that were encroaching upon and destroying the forest which grew at the margin of the glacier. It was a marvellous change, almost weird in its character, to see a glacier, after at least a half century of stagnation, thus suddenly spring into activity, and carry with it the destruction of the ice, the soil and the forest-cover.

Of the many other glaciers in the Yakutat Bay region, three had undergone similar change, and two of these, in the summer of 1905, we had walked over freely and without encountering crevassing. In 1906 they were utterly impassable. Two or three others show signs of the coming of an advance by crevassing high up the mountain valley. In the remainder no signs of coming change were observed.

So far as I know, no similar change in glaciers has ever been observed. It is not uncommon for the terminus of valley glaciers to slowly advance or recede, and sometimes to change from recession to advance. But for a glacier within a period of ten months to abso-

lutely change its character, from a smooth surface, easily traversed, to a labyrinth of crevasses, rendering the entire glacier impassable, has been, I believe, hitherto unknown.

FIG. 5—CREVASSED EASTERN PORTION OF MALASPINA GLACIER, 1906. (PHOTOGRAPH BY C. VON ENGELN.)

In seeking an explanation of this remarkable phenomenon, one cannot appeal to ordinary causes. After a careful consideration of

all hypotheses which could be thought of, I have been forced to abandon all but one, which alone seems capable of explaining all the phenomena, and against which no facts could be marshalled.

In September, 1899, this region was visited by a series of earthquakes two of which attained such exceptional intensity as to warrant their classification as world-shaking. They were recorded on seismographs at points as remote as Tokio in Japan, Cape Town, South Africa, and Rome, in Italy. A recent publication by an eminent seismologist has selected these earthquakes as among the most violent recorded on the seismographs of the world. My own observations along the shores of Yakutat Bay prove that during the earthquakes the land was uplifted from 10 to 47 feet, this proof consisting of the evidence of elevated beaches on which marine animals, notably barnacles, were still clinging. The evidence of prospectors is conclusive that during the shocks enormous masses of snow, ice and rock were shaken down from the mountain slopes.

If a slight increase in snowfall occurs in the supply ground of a valley glacier, it starts a wave which, passing from the reservoir, extends down the glacier, ultimately reaching the end and causing it to slowly advance. What, then, must have been the result of the sudden addition of enormous quantities of snow and ice to the névé region of the glaciers in the Saint Elias mountains? No other answer could be given to this question than that a correspondingly great wave must have resulted from such unusual increase in supply.

Exactly what would follow from the passage of such a wave down the glacier cannot be told from previous experience; but, on general principles, it seems highly probable that its effect would be to cause a sudden forward movement, accompanied, no doubt, by pronounced crevassing. From the evidence of actual conditions in the glaciers of this region, it seems clear that such a result has actually followed from the cause which we know to have occurred. The chief difficulty lies in the fact that the effect has followed so quickly upon the cause, and that it has produced such sudden and startling results.

That the phenomenon has not been previously observed, is, in reality, not so very remarkable, for it could occur only in a region where three exceptional conditions occur: (1) Well-defined glaciers, (2) immense snow fields, (3) violent earthquakes. All three of these conditions are present in the Saint Elias region. Doubtless they occur also in other mountains, as, for example, the Himalayas; but the final cause for such an advance--namely, earth-shaking, occurs at widely-separated intervals, and the sections most likely to be

affected are, like this very region of the Saint Elias mountains, remote from centres of population, and consequently not likely to be observed closely. It is, therefore, not at all impossible that similar changes have occurred in other glacial regions, having hitherto escaped attention.

What the future has in store for the glaciers of the Saint Elias mountains as a result of the cause that has forced some of them forward, is not certain; but it would be surprising if some of the other glaciers of the region do not also advance in the near future. It is, in fact, not at all unlikely that all the large glaciers contributing to form the Malaspina will feel the impetus of the thrust which so far has pushed only the Marvine forward. In that case the entire Malaspina Glacier will be transformed to the condition now noticed in its eastern portion. It will be interesting and important to watch these glaciers for the next few years; and it is to be hoped that means may be provided for doing this.

RACIAL AND REGIONAL STUDY OF THE VIRGINIA POPULATION.

BY

G. T. SURFACE.

The distribution of population in a new or old country affords an essential key for determining the factors of geographic control and economic response. In this brief discussion we cannot hope to do more than point out some of the salient facts relative to the establishment, evolution, and distribution of the people of Virginia.

The Indians, who were in possession of the territory prior to colonization, divided themselves into three confederacies—the *Powhatans, Mannahoacs,* and *Monacans.* The Powhatan confederacy occupied the Coastal Plain region and southern Piedmont, and consisted of 30 tribes; the tribes inhabiting the headwaters of the Potomac and the Rappahannock Rivers were attached to the Mannahoacs; while those of the headwaters of the James River and the Great Valley belonged to the powerful Monacans. The territory of the Monacans was always referred to by the eastern tribes as "the stony region." From this we see that the aboriginal people were distributed and divided according to distinct economic and physiographic conditions. The tribes of the three confederacies spoke languages so radically

different that interpreters were necessary for the transmission of communications. Each was as distinctly adjusted to his primitive environment as was the Cavalier, the small German farmer, and the Scotch-Irish mountaineer of a century later. The Powhatans and the Monacans were naturally the most densely-populated because their food supplies were both more abundant and more accessible, and the density in any local area was in direct proportion to the ease with which a livelihood could be obtained. Captain John Smith estimated, in 1609, that there were 5,000 Indians within 60 miles of Jamestown.

The only vestige of Indian blood remaining which can be identified with any degree of certainty is that of two small reservations in King William County, and these are considerably more negro than Indian. The larger band numbers 120, and they call themselves *Pamunkies;* the smaller numbers about 50, and they call themselves *Mattaponies.* They are both governed by chiefs and councillors, together with a board of white trustees chosen by themselves. That they can lay some claim to being descendants of Powhatan may be inferred from Thomas Jefferson's reference to the Mattaponies and Pamunkies still occupying, in 1787, small holdings in King William County, on the streams bearing their names.*

Most of the Virginia colonists of the 17th Century were *English.* Of these a small minority were of the English gentry, while the free and indentured † servants constituted the vast majority. Though these classes were of the same race, they were as widely separated in point of ability and social standing as if they had belonged to different races. They came for the most part from southwestern England, many being from the city of Bristol, and settled on the Coastal Plain and along the eastern border of Piedmont. The Cavaliers did not come in large numbers until after 1649. By 1790 they were estimated to number 250,000 and to represent the majority of the free whites. That almost all of them became planters, and became political and social rulers, is so well known as not to demand a discussion.

The *Quakers* began to make their appearance in 1656, and the first immigrants settled in Nansemond County. As the agitation against them increased, some of them moved to the western Piedmont and Valley region; but they continued stronger in the southeastern portion of the State than they became elsewhere.

Small parties of *French Huguenots* were introduced in the early

* Lecky—England in the 18th Century, Vol. 3.
† Servants bonded for a time service to pay for transportation.

part of the 17th Century for the purpose of planting vineyards and conducting that industry, but their coming was not fostered by the Government until 1700. In this year Colonel Byrd * negotiated for the landing of 500 Huguenot refugees, who were distributed as follows, according to Brock:† "They appear to have settled at different points; a portion about Jamestown, some in Norfolk County, others in Surrey, and 200 or more at a point some 20 miles above Richmond, on the south side of the James River (Powhatan County), where 10,000 acres of land, which had been occupied by the extinct Mannakin tribe, was given them." This settlement was made a distinct parish by an Act of the Assembly, December, 1700. They were accepted as desirable foreign immigrants because they accepted as a class the religion of the Established Church. The Huguenots were the most intelligent and enterprising Frenchmen of the 17th Century. Many were merchants and manufacturers, and few belonged to the French peasantry, or wage-earning class. Henry Cabot Lodge has attempted to differentiate the American "notables" according to race. He finds that 589 of the 14,243 listed in Appleton's Enclycopedia of American Biography are of Huguenot descent, which would indicate on that basis of comparison a percentage of ability higher than that of any other race. The immigrants to America being largely a select class of tradesmen and artisans, combined with the readiness with which they assimilated the language and religion, gave them a special opportunity for advancement.

The German immigrants during the early colonization of Virginia are usually spoken of as "skilled workmen of the trades," but their immigration did not assume important proportions until after the beginning of the 18th Century. About this time they began to come in large numbers as an overflow from Pennsylvania, where the policy of William Penn was so favourable that more than 500,000 came to that State in 20 years. As a class they were poor, and those who came from England were religious refugees. The land of the eastern part of the State was occupied, and the attitude of these English colonists was anything but generous to *separatists* of any class. The presence of a frontier protection barrier was, however, so desirable as to make their presence in the western part of the State tolerated. Here land was cheapest, and the Great Valley gateway opened directly into it, so it was but natural that the Germans settled chiefly in the Valley and the western Piedmont counties. It is in this region

* Lecky—England in the 18th Century, Vol. 3.

† R. M. La Follette. The Making of America, Vol. 1, p. 16.

that we find their descendants in large numbers to-day; and they are, as a rule, industrious, thrifty, frugal, and pious.

More *Scotch-Irish* settled in Virginia in the 18th Century than any other class. This is a mixed race, made up of the primitive Scot and Pict, the primitive Briton, the primitive Irish, but with a larger admixture of the later Norwegian, Dane, Saxon, and Angle. The discriminatory trade laws passed by the Irish Parliament in 1698 destroyed their industrial prospects; and the Test Act of Queen Anne's Parliament, compelling public officials to take the communion of the Established Church, deprived them entirely of self-government. With this they began to migrate in large numbers. They found in Massachusetts a State church to which they must conform to be admitted to citizenship; the Dutch of New York were unfriendly to them; the Germans were localized and in possession of eastern Pennsylvania and Maryland; and the English held eastern Virginia. In consequence, the great majority went west into central and western Pennsylvania, and southward through the Great Valley into the frontier country of Virginia, on into east Tennessee and western North Carolina. So favourable were the geographic conditions that they became the dominant class in the Valley. While the planters of eastern Virginia were living in luxury and ease, with an abundance of time and ambition for political and social pursuits, these hardy immigrants were building houses, clearing forests, tilling the soil, and fighting the ever-menacing Indians. They were brave, brawny, resolute, robust, and industrious. Their experiences in Scotland had been such as to make them brave and self-reliant, and appreciative of the conditions of freedom.

Much of this 18th Century frontier region has, under the touch of skill and civilization, become the garden spot of the State, with the largest wealth *per capita* of any section in the State; but many of the communities are the direct descendants of the first settlers, with scarcely a trace of foreign admixture, and are probably the purest stock in America.

The *Italians* did not become an important part of Virginia immigration until within the past three decades, but are coming now in larger numbers than any other race. Two causes explain this unusual influx: first, the immense Italian immigration to America—200,000 per year; and, second, the unprecedented industrial activity of the State, such as railroad construction, mineral development, and factory enterprises. Most of them are from southern Italy, where the agricultural wages are from 8 to 32 cents per day. They command in Virginia $1.25 to $3.00 per day in mining, and $1.50 to

$3.00 per day in railroad construction. They are the most migratory of our foreign constituency. They are also the most illiterate, the most subservient to superiors, and yet among the most thrifty and industrious of our common labourers. Their standards of living are naturally low, the majority being of the peasantry who have fled from poverty, congested population, and the oppression of the landlord system. We get very few immigrants from northern Italy, which has that intellectual, educated, and progressive type, so well demonstrated in their development of the Argentine Republic. In Buenos Aires they constitute one-third of the population, and own one-half of the commercial capital of the city.

The *negro* population of the State is undergoing a rapid readjustment in aggregate and territorial distribution. According to the 1900 Census, there were 55,000 negroes to every 100,000 whites, as compared with 62,290 to each 100,000 whites in 1890. The white population increased 16.9 per cent. in the last decade, while the negro increased but 4 per cent. The negro population in the different geographic divisions is distributed as follows in the order of density: Piedmont, Tidewater, the Valley, Appalachia, and the Blue Ridge.

The migration is taking place in four directions: from the State as a whole to northern and eastern cities; from the non-mining districts to the mining districts; from the country to the cities and towns of the State; and from the mountains to the valleys. The population was never large in the mountain sections, but almost all of the few thousands who lived in the mountains have moved out. More than 30 per cent of the total coloured population live in cities and towns, while less than 20 per cent of the white population is urban. The relative decrease in the population is attributed to the high death-rate, and the northern migration—chiefly to Washington, Baltimore, Philadelphia, and New York. The census returns from ten southern cities gave the coloured death-rate at 30.5 per 1,000 coloured persons, while for the whites it was 17.9 per 1,000 in the same cities. The coloured infantile death-rate is nothing less than appalling—371 deaths to 1,000 children born, as compared with 148 among the whites. The coloured death-rate from tubercular trouble is more than two and one-half times as great as among the whites. What statistics we have on this subject for the years 1820 to 1850 indicate that the coloured death-rate from this cause was less than that of the whites. The causes are too numerous for a full discussion in this paper. The most apparent are—the change from an open-air country life to congested city life, prevalence of immorality

and vice, ignorance of the laws of health, lack of medical attention, and the lack of institutions for antagonizing disease. The economic safety of the white population and the rescue of the negro from physical degeneration demand that the situation receive prompt and vigorous attention at the hand of the Government (State and Federal), of all institutions organized for the purpose of safe-guarding the interests of humanity, and of every citizen and individual who prizes the health of his own family as worthy of protection.

As a factor in the labour situation, the negro is important; but it is difficult to predict his economic future. In Virginia he is drifting rapidly away from agriculture, is generally unsatisfactory in factory service, and many are developing such a marked aversion to domestic service as to be willing to live in poverty rather than engage in it. In whatever service engaged he is irregular, but, notwithstanding this serious objection, is generally considered as the most satisfactory labourer in construction work and mining operations. The same may be said of his services in restaurants and hotels.

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Population statistics supply at least a partial gradient for reading the economic and social conditions underlying them. During the decade 1890-1900, the general population of the State increased 16 per cent., the rural population a little less than 12, and the urban population 22.7. As a rule, economic factors are predominant in the shifting and readjustment of population; but in the case of the negro social factors seem to be of paramount importance. Since each natural division of the State has its own distinct economic environment, it will be interesting to examine into the human response as expressed by the redistribution which is in progress. The average increase in Tidewater was (1890-1900) 14.1 per cent., this being exclusive of incorporated towns. This evidences a normal healthful growth in the development of agriculture, which is the only rural source of wealth.

Passing to Piedmont, the population curve rapidly descends to an average increase of 4.3 per cent. How shall we explain the relative decrease? In six counties within 60 miles of Richmond there was an absolute decrease, the result of city migration for more lucrative employment than the worn and frequently sterile soil can realize, better educational and religious advantages, and the purchase of country real estate by city investors.

There are only three counties which are situated wholly in the Blue Ridge division: Floyd, Carroll, and Grayson. These are rugged plateau counties, which until recently were 20 to 30 miles

from railroad connection, and in consequence are devoted entirely to agricultural pursuits. The population increased in the past decade 16.1 per cent. From a careful field survey of this region I am convinced that the large increase is due to the prevalence of large families. The small family is in that region the exception.

The Valley has had a normal healthful growth, with an increase of 13.5 per cent. This is the most productive agricultural region of the State. It has for many years been served by a railroad line throughout its length. The productivity of the soil, proximity to shipping points and small towns, and a native population trained to labour with the hands have minimized the tendency toward urban migration.

Appalachia has been the scene of the most phenomenal development, chiefly through the growth of the coal and iron industries. The average increase in population 1890-1900 was 29.9 per cent., and the increase since 1900 has been even greater. Wise County showed an increase of 110.3 per cent.; Allegheny, 75.9 per cent.; Buchanan, 65.2 per cent.; and Dickenson, 52.6 per cent.

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Of the total population engaged in some gainful occupation (536,883), 45.4 per cent. are engaged in agriculture, as compared with 51.5 per cent. in 1880; 15 per cent. in domestic and personal service; 14.1 per cent. in manufactures and mechanical pursuits; 11.2 per cent. in trade and transportation (as compared with 6.4 per cent. in 1880); 2.5 per cent. in professional service; 1.4 per cent. in fishing; 1.1 per cent. in mining and quarrying; and the remaining 9.4 per cent. in sundry vocations.

GEOGRAPHICAL RECORD.

AFRICA.

SUICIDE AMONG BARBAROUS PEOPLES.—In his book "The Lower Niger and its Tribes," Mr. Arthur Glyn Leonard says that in the Brass district of the Lower Niger there are many cases of suicide. One of the commonest methods is to hold the breath, which is done with so much determination as invariably to result in death. While this form of death is regarded by some of the most intelligent chiefs as deliberate self-murder, it is undoubtedly the result of mental derangement due to the impression that the person is afflicted by malign influences. Other methods of suicide are employed in this region. A canoe builder exiled from Brass for some reason, who earned a good living at his trade, was always unhappy because he was not permitted to return to his home, and finally he shot

himself. Owing to able medical treatment his life was saved. He said that as he could not get back to his people, he had no wish to live, and, moreover, the tree spirits living in the bush where he made his canoes were hostile to him and he feared they would take his life.

Among the Ijo people, suicide of the violent kind is very common. A labourer working for the Niger Company, simply because his wife had upbraided him in the morning, promptly drank two bottles of gin and then hanged himself from a beam. Another Ijo native, who had formed an attachment with a certain woman, shot her when she refused to return with him to his own country and then put an end to his life. The sensitive and phenomenally impulsive nature of these simple people is illustrated in the case of an Efik youth, a slave of one of the big chiefs, who quietly retired into the bush and killed himself because he had been accused of theft from one of the factories. The majority of Ijo natives condemn suicide as a piece of folly, and it is generally spoken of as a devilish or evil death.

From Victoria Nyanza to Kilimanjaro.—Captain G. B. Smith describes in the March number of the *Geographical Journal* the journey between Victoria Lake and Mount Kilimanjaro which he made in 1904, as Commander of the British section of the Anglo-German Boundary Commission. His map across this little-known country will be printed later by the Royal Geographical Society. Detailed mapping was required along the boundary and, when favourable opportunities occurred, was also carried out elsewhere. The determination of the level of Victoria Nyanza is 3,737 feet, which does not differ greatly from that of the railway survey, 3,726 feet. The geographical results included triangulation without break from Zanzibar to Kisumu, the terminus of the Uganda railroad on Victoria Nyanza, and this long series of triangles is connected with Lieut.-Col. Delme-Radcliffe's chain from Kisumu to the intersection of the Anglo-German and Anglo-Congo boundaries west of Victoria Nyanza. In the discussion of Captain Smith's paper, Major Close referred to the great succession of elaborate surveys every year that are gradually reducing Africa to a region as well known as the United Kingdom: "There is hardly a town in Africa that we do not know the position of within about ten miles—in fact, most towns we know within two or three miles."

Major Villiers said that in British East Africa they are beginning to raise Australian sheep, and there is no doubt that on the high plateau of that Protectorate sheep will thrive well.

The Alexander-Gosling Expedition to Africa.—*Nature* reports that Lieut. Boyd Alexander, who, with his brother, Captain Claud Alexander, Captain G. B. Gosling, Mr. P. A. Talbot, surveyor, and a Portuguese collector, left England in the spring of 1904 on an exploring expedition across Africa, has returned to London. Captain Claud Alexander died at Naifoni in November, 1904, and Captain Gosling in the Ubangi-Welle region in June, 1906. Much valuable work was accomplished. A careful triangulation was carried out from Ibi in Nigeria, to Lake Chad, and the lake itself was traversed in various directions. Part of the course of the Shari was explored; from thence the Ubangi was reached and the expedition made its way northward to the little-known region where many of the Bahr-el-Ghazal tributaries rise, and then proceeded down the Yei to the Nile. The expedition was particularly successful in collecting specimens in natural history, including skulls, bones, and skins of the okapi.

CHANGES OF CLIMATE IN AFRICA.—A good many reports have been brought back from Central Africa by various explorers and travellers during recent years to the effect that the lakes in that region are drying up. These reports have given rise to the belief that permanent progressive changes in climate are now taking place in Africa. Critical investigation is always necessary in such matters, before any definite conclusions are reached, and thus far climatologists have not been satisfied that there is any evidence of unquestioned reliability which necessarily leads to a belief in progressive climatic changes within historic times. The reports from little-known regions are very often contradictory, and when carefully matched do not lead to any definite result. Regarding the African lakes, Major A. St. H. Gibbons points out, in a recent article on "The Transition of British Africa" (*Scot. Geogr. Mag.*, March, 1907), that there are evidences of a down-cutting of the lake outlets which would result in a draining of the lakes, and thus give the appearance of progressive desiccation. Speaking of the lakes of equatorial Africa, Major Gibbons says that "three at least are victims of the same gradual erosive action which in centuries gone by deprived the Zambezi of its great lakes." Lake Mweru must, he believes, have had at least four times its present area before the outlet had begun to erode the rocks at the base of the valley through which it now flows. The Lukugu outlet of Tanganyika passes over a sand bar, and Major Gibbons believes that the same lowering process will continue there until bed-rock is reached. Tanganyika gives evidence of annual lowering of 10 inches. Much has been written of the lowering of Lake Ngami. Major Gibbons reports that this body of water shows signs of refilling in the last few years.

All this shows the need of the greatest caution in interpreting the facts which lead to a belief in climatic changes. R. DEC. W.

AMERICA.

THE INLAND WATERWAYS COMMISSION.—A Commission with this title has been appointed by President Roosevelt. Its members are: Hon. Theo. E. Burton, chairman; Senator Francis G. Newlands, Senator William Warner, Hon. John H. Bankhead, General Alexander Mackenzie, Dr. W. J. McGee, Mr. F. H. Newell, Mr. Gifford Pinchot, Hon. Herbert Knox Smith.

In his letter to the Commission, the President says that the time has come for merging local projects and uses of the inland waters in a comprehensive plan designated for the benefit of the entire country. The railroads are no longer able to move crops and manufactures rapidly enough to secure the prompt transaction of the nation's business. The products of the northern interior States have doubled in ten years, while the railroad facilities have increased but one-eighth. There is small prospect of immediate relief and no development of the railroads in the near future is possible which will keep transportation abreast of production.

There appears to be but one remedy—the development of a complementary system of transportation by water. Our streams should be considered and conserved as great natural resources. The Commission is asked to take the whole subject into consideration:

> Any plan for utilizing our inland waterways should consider floods and their control by forests and other means; the protection of bottomlands from injury by overflows and uplands from loss by soil-wash; the physics of sediment-charged waters and the physical or other ways of purifying them; the construction of dams and locks, not only to facilitate navigation, but to control the character and movement of the waters; and should look to the full use and control of our running waters and the complete artificialization of our waterways for the benefit of our people as a whole.

The President's letter adds that the reports of the Commission should include both a general statement of the problem and recommendations as to the manner and means of attacking it.

WESTERN COAL FIELDS.—The U. S. Geological Survey has paid much attention during the past season to coal in the western States. These fields are extensive, but, as yet, are little developed, and some of them are only slightly known. Bulletin 297 prints the final report which Mr. H. S. Gale and his party made of the Yampa field in northwestern Colorado. Last summer, Mr. Gale carried a topographic and geologic survey over an area of 1,000 square miles extending south from the Yampa field through parts of Rio Blanco and Garfield counties, in what are known as the White River and Grand River coal fields. *Economic Geology* (1907, No. 2,) says there are many thick coal beds throughout this area, mostly bituminous coal, which will make excellent steam and domestic fuel. Mr. Gale has in hand a considerable amount of information concerning coal areas in Colorado, which promise to provide fuel for that State for hundreds of years and have some to spare for less fortunate neighbours.

DRAINING THE EVERGLADES.—The United States are confronted by the problem of removing water from lands which suffer from a surplus, as well as by the problem of bringing water to land suffering from a deficiency. The Florida Everglades form a swampy plain extending from the south shore of Lake Okeechobee to the southern boundary of the State. They have an area of 5,000 square miles covered with saw grass of extraordinary height, relieved by scattered hillocks on which grow pine and palmetto trees, and various subtropical bushes.

The entire plain is covered with water to various depths throughout the year. The water is derived in part from an annual rainfall of 60 inches and in part from the overflow of Lake Okeechobee. The lake receives the drainage of an area of 5,000 square miles in the northern part of the State. As the only regular outlet is the small channel of the Caloosahatchee River, which discharges westerly into the Gulf of Mexico, the lake often spills over into the Everglades.

It seems probable that by enlarging the channel of the Caloosahatchee and by constructing canals, the water can be drawn from a large part of the Everglades. It is also probable that the muck on which the water now stands will prove highly fertile when it is rendered comparatively dry and has had an opportunity to become aerated. Both these propositions have been violently, almost bitterly, opposed. In order to ascertain the actual facts in the case the U. S. Department of Agriculture, through the Bureau of Irrigation and Drainage Investigations of the Office of Experiment Stations, has made the matter a subject of special study. Under the charge of Mr. John T. Stewart, a line of levels is being run across the peninsula of Florida from Fort Myers on the west to an undesignated point on the east. The relation of the level of the surface and bottom of the water of the northern part of the Everglades to the level of Lake Okeechobee and to tidewater will be ascertained; and the character and depth of the muck overlying the supposed rock floor of the region will be carefully studied. If the drainage of the Everglades proves possible and if the soil is as fertile as there is reason to expect, the habitable portion of the United States will be increased by an area as large as that of Connecticut. E. H.

SPREAD OF THE BOLL WEEVIL.—The *Report* for 1906 of the Agricultural Experiment Stations of the Louisiana State University says that the boll weevil continues to make rapid progress in the invasion of the State. Points near the

Ouachita River have been reached, and by the close of 1907 the pest will be found in all but the easterly parishes of the State. The past season in the heavily-infected area, however, has demonstrated that moderate crops of cotton may be raised in the presence of the boll weevil, if the planter follows an intensive system of cultivation and fertilizes and selects his seed for early maturity:

The people do not feel the apprehension on this subject that they did two years ago. By the best system of agriculture in vogue we may still grow cotton as our principal money crop in the cotton section.

THE ORIGIN OF AMERICAN COLD WAVES.—Professor Cleveland Abbe, of the United States Weather Bureau, in the *Monthly Weather Review*, Vol. XXXIV, 1906, 518-519, gives in brief the three theories which are held regarding the origin of North American cold waves. One theory holds that cold waves are due to upper westerly winds which blow over the Rocky Mountains toward barometric depressions. The descending air, dry and clear, cools by radiation more rapidly than it warms by compression. A second theory holds that cold waves are horizontal protrusions to the south from great areas of cold, lower air in Arctic America. A thin lower stratum of this cold air is drawn southward by a cyclonic area in tropical America, the Gulf States or the West Indies. According to the third theory a cold, upper anti-trade comes from equatorial regions to the Arctic on gentle gradients. Its temperature is so low that when it finally descends to sea-level in latitudes 50°-70° north, the warming by compression does not raise its temperature above the low readings noted in severe cold waves. Professor Abbe adds that possibly all three of these theories must be combined in order to explain the actual conditions.

R. DEC. W.

CHANGE IN THE CLIMATE OF KANSAS.—Professor Willis L. Moore, Chief of the Weather Bureau, recently made certain statements regarding the Great Plains, in which the opinion was expressed that no permanent change in climate has taken place there. In reply to Professor Moore, Dr. F. H. Snow, of the University of Kansas, has issued a brief report, setting forth the results of his own observations, in which he holds the opposite view. Dr. Snow maintains that an increase of rainfall which his observations appear to show during the latter half of a thirty-nine year period, has been brought about by human agency, the effective cause of the change being the planting of trees, the breaking up of the soil, etc. A decrease in wind velocity in recent years, and an increase in relative humidity, are also noted. The change in rainfall and wind velocity has been, according to Dr. Snow, more than 10 per cent.; the increase in relative humidity more than 6 per cent.

It may be noted, in reference to this general question, that the observations to which Dr. Snow refers cover too short a period for any accurate generalization, and that it is the consensus of opinion among climatologists that permanent, progressive climatic changes are not taking place, although it is perfectly clear that slight oscillations, first in one direction and then in another, are occurring.

R. DEC. W.

THE CAPE COD SHIP-CANAL.—After half a century of agitation, the construction of a ship-canal across the western end of Cape Cod is at length assured. The August Belmont syndicate of New York under the name of the Cape Cod Construction Company has been awarded the contract for the entire work of building the canal. The bid of the company, $11,990,000, covers all the construction, although it is understood that much of the work will be done under sub-contracts.

Wm. B. Parsons is to be chief engineer, and with him is to be associated John B. McDonald, the New York subway contractor. Probably the majority of the unskilled labourers will be Italians, hired in New York. A large number of masons and carpenters as well as other skilled workmen will also have to be brought from a distance, while the local Cape Cod farmers will be relied on for odd jobs and teaming. Unless there should be some unforeseen difficulty, such as delay in coming to an agreement with the New York, New Haven and Hartford Railroad, work will begin in the middle of May. Two years ought to suffice for the rough work of digging and grading; and it is expected that the canal will be ready for use by the spring of 1910. The water-route from Boston to New York will then be only about 260 miles long, instead of 330 as it now is. E. H.

Canadian Tidal and Current Survey.—This Survey, which is attached to the Department of Marine and Fisheries at Ottawa, has just reprinted its first *Report* of progress, which appeared in 1894 and has long been out of print. It explains the lack of information on tides and currents which then existed throughout Canada and was seriously felt by the shipping interest. The purpose in organizing the Survey was to obtain practical information concerning tides and currents for the Atlantic and Pacific coasts of Canada. The Survey now issues Tide Tables regularly, and publishes information on currents, which is widely distributed.

Indian Types in the Amazon Basin.—Dr. Theodore Koch-Grünberg's ethnological researches (1903-05) in the region of the upper Rio Negro have been briefly described in the Bulletin (1906, pp. 376-7). This part of the upper Amazon basin was very little known, and the explorer improved the opportunity not only to study the new tribes of Indians he met but also to trace some of the hitherto unknown head waters of the Rio Negro, so that his map is, in part, original material for the cartographers. He has recently issued a series of folio sheets, "Indianertypen aus dem Amazonasgebiet," containing admirable photographic reproductions of the Indian types he met. His publisher, Herr Ernst Wasmuth, of Berlin, has sent to the Society *Lieferung 1*, containing twenty of these plates, which are devoted to Tukano types, excepting four figures on plates 14 and 15, which are Miriti-Tapuyo.

These fine type photographs which Dr. Koch-Grünberg is now publishing are especially welcome, because, while there are rich collections of this kind from most other parts of South America, they were wholly lacking from the region visited by this ethnologist. His entire collection includes about 300 types from nine tribes.

The photographs have been reproduced without any retouching. The sheet usually shows two persons, each in profile and full face. The letterpress gives a description of the physical characteristics of each type pictured, together with a summary account of its geographical environment.

ASIA.

A Letter from Dr. Sven Hedin.—Further particulars are received in a personal letter from Dr. Sven Hedin to Reuter's correspondent at Calcutta, regarding his remarkable trip across Tibet from north to south. The letter is dated Shigatse, Feb. 22. The explorer says:

The country between the Ngangtsi-tso [tso = Lake] and the Brahmaputra is one of the most interesting portions of Tibet. The plateau stretching to the south, hitherto unknown, is one of the highest

on the earth. The watershed between the Ngantsi-tso and the Brahmaputra is situated further north than has been believed, and the country consists of the most complicated labyrinth of ranges and ramifications of rivers. Big rivers flow from this district to the Brahmaputra. At Shigatse there are large villages with temples and gardens low down on the north side of the river.

From Stanagbo the explorer travelled by boat. The river was full of floating ice, and there was a constant stream of boats with pilgrims on their way to the New Year festivals at Tashi Lumpo [near Shigatse, the largest lamasery in Tibet]. Dr. Sven Hedin met with a very hearty welcome. The Tashi Lama overwhelmed him with kindness, giving him presents of pack animals and provisions and allowing him to sketch and photograph everywhere. He describes the Tashi Lama as a most wonderful and sympathetic man. Dr. Sven Hedin had an interview with him lasting several hours at Labrange. The explorer, at the time of writing, was again starting for unknown regions.

Between Chinese Turkestan and the southern border of Tibet, Dr. Sven Hedin travelled 840 miles in unexplored country, all of which was mapped, points being fixed astronomically and panoramas drawn. A meteorological journal was carefully kept and many photographs were taken. A comprehensive geographical account of the whole journey was drawn up and over 200 specimens of rocks, in connection with geological profiles, were secured.

Before the expedition met the first Tibetans at Bog-chang, Tsangpo, it was suffering from great privation. It had not seen a human footprint for eighty-three days, and the caravan, which had consisted at the start of 122 ponies and mules, had so dwindled that the twenty-five Ladakhi servants had to carry much of the baggage. When the caravan reached Ngangsi-tso only eight ponies and one mule were left, but, fortunately, Dr. Sven Hedin was able to buy twenty-two good yaks from the Tibetans. The explorer, his two assistants, and the Ladakhis, all enjoyed good health in spite of the intense cold and the privations they endured.

British Trade with Persia.—In connection with the report of the British Indian Commercial Mission to south-eastern Persia, commented upon in the February number of the Bulletin, it is interesting to find that a Parsi merchant of India criticises British methods in the same way as does the Mission. Mr. N. M. Parveez, writing in the January number of the *Asiatic Quarterly Review*, states that within the last few years British, including Indian, trade with Persia has declined, while that of Russia has increased 15 or 20 per cent. He attributes this only, in part, to Russia's superior geographical position, and in part to the Englishman's traditional contempt of trade. British consuls in Persia being usually military men, "loathe the name of trade, and look on any one seeking information as a person to be discouraged, because he seeks that which is, as a rule, not available. . . . The Russian consuls are keen and active in promotion of trade." The British banker in Persia, as another traveller states, often spends his afternoons in riding, or playing tennis; while the Russian banker, who is frequently a Finn or an Armenian, sits in the native shops and watches what kind of goods the natives buy most readily, in order to advise his correspondents.

Mr. Parveez points out two hopeful lines of development in Persia. One is found in the rich copper, iron, and other mines in the eastern part of the country; the other lies in the use of the automobile. Profitable railroad construction is almost out of the question because of the scarcity of population. Roads fit for automobiles, on the other hand, can be constructed at comparatively slight expense in the vast gravel plains and salt deserts of the eastern part of the country.

At present the balance of trade is enormously against Persia. The imports are nearly ten million dollars greater than the exports, which amount to between fifteen and twenty million. This is partly due to the character of the native traders: "They have no idea of the value of time, particularly in relation to the payment of their debts. They are even slower in discharging financial obligations than in making up their minds. Instead of persevering with the sale of a particular class of goods, they alternate between one department of trade and another, and it often happens that they owe for articles they have long since ceased to supply."

According to Mr. Parveez, and to most authorities on Persia, "the greatest of all obstacles to trade advancement lies in the character of the administration, and the conservative prejudice of the priesthood." Back of this, however, appears to lie the fact that the physical condition of Persia has been deteriorating for centuries. Slight failures of rainfall have caused repeated famines and untold misery. The people have more and more grown "poor, lazy and feckless, though they are distinctly intelligent;" nothing has been introduced to counteract the effect of adverse physical environment, and hence, it would seem, has come universal corruption, both in office and out; and naturally trade cannot flourish. E. H.

Leading Port of the Persian Gulf.—Bander Abbas is perhaps the best and most conveniently situated port on the Gulf, with the exception of Ahwaz, over which it has the advantage of a shorter sea lead. It is the natural southern entrance for and outlet of the trade, not only of south-east Persia, but of the whole of the immense tract of country lying beween Herat and Yezd, Meshed, and Bampur. The Persian Government has made little effort to secure the proper development of the port and district. There is a fairly good roadstead, which might be made into a really good harbour by dredging and building a mole. On the other hand, Bushire, far up the east coast, has no harbour, and its two roadsteads are of such a character that vessels of any tonnage have to anchor a long way out.

Unfortunately, the roads leading from Bander Abbas to the various trade centres in the interior are not safe, but this is true also on the Bushire-Yezd routes. The development of the great region of which the port of Bander Abbas is the mouth and the improvement of the port will mean great things for Persia, for they will bring wealth to the Shah and his subjects.—(*Report on the British Indian Commercial Mission to S. E. Persia during 1904-1905.*)

The New Era in China.—Lieut.-Col. Wingate continues the account of his nine years' survey and exploration in northern and central China in the March number of the *Geographical Journal*. He found that in the ancient city of Lū-chou and also in Ngan-ching, the capital of Ngan-hui, rapid progress is being made in education along modern lines. Splendid schools and hospitals are in operation, and the thirst for Western knowledge is apparent on every hand. The inhabitants of southern Ngan-hui, especially, are anxious for all modern and Western improvements. In northern China most of the inhabitants desire railroads, mines, and every kind of occidental invention and improvement. Lieut.-Col. Wingate found many Chinese in the interior anxious for the extension of the railroad, the telegraph, and the post office to their towns and villages. He believes, however, that many Chinese are too confident of their ability to accomplish great things unaided.

Origin of Agriculture and of Settled Society in Central Asian Oases.—With the gradual shrinking in dimensions of habitable areas and the disappear-

ance of herds of wild animals, man, concentrating on the oases and forced to conquer new means of support, began to utilize the native plants, and from these he learned the use of seeds of different grasses growing in the dry land and in the marshes at the mouths of larger streams on the desert. With the increase of population and its necessities, he learned to plant the seeds, thus making, by conscious or unconscious selection, the first step in the evolution of the whole series of cereals.

For a long time the rainfall was doubtless sufficient to ripen grains, as it still is in some of the valleys of Ferghana, and in some years even at Samarkand. Later, experience taught the need, and some simple method, of artificial watering, and in this acquisition lay the germ of agriculture and of the conquest of the arid regions of the globe.

In Asia it rendered possible the civilizations of Elam and Mesopotamia. All the really great prehistoric cultures were developed in arid regions—all of those of which we have knowledge, and perhaps others of which we have not yet found the remains, in Mongolia, Arabia, and the Sahara; while in America we have an instance in Peru. The fertile loess on the semi-arid borders of such regions and the equally generous soil of the delta oasis were the foundation on which the independent cultures of village communities were built up. Only later, when the knowledge thus obtained could be applied to the utilization of great rivers in turning wide deserts into gardens, was it possible to render populous great countries under the centralized power that constituted empire. This stage was never fully reached in central Asia and northern Persia. The countless isolated oases, even under Chaldean, Persian, and Arab dominion, never advanced really much more than nominally beyond the feudal stage. . . . .

Shut off from the periphery of Asia and from the other continents while still in a low state of savagery, we see man gradually broken up into smaller groups, which are forced into isolation on, in the main, continually diminishing habitable oases; and we see on these the growth of differentiated, but fundamentally related, cultures. Lastly, and most important of all to us, we see here man under the spur of necessity, the relentless goddess of evolution, building in village communities, in agriculture and in the essential industries the foundation of civilizations, to the reaction of which upon cultures evolved in the oases of the Sahara, and on the Nile, and in Mesopotamia we owe the framework of modern Western civilization.—(*From Presidential Address by Dr. R. Pumpelly, read before the Geol. Soc. of Amer., Dec. 27, 1906.*)

EUROPE.

Suicide in Germany.—Since 1899 the *Vierteljahrshefte des Deutschen Reichs* has published the statistics of suicide in the empire, and from 1893 to 1898 inclusive, they were recorded in the *Statistisches Jahrbuch*. The first number of the *Vierteljahrshefte* for 1907 collates the total statistics for the eleven years, 1895-1905, and prints comparative statistics by states and provinces for 1902-1905 inclusive. There is little variation in the total number of suicides from year to year, excepting that the number is gradually increasing, and this is obviously due, for the most part, to the growth of population. The total number of cases in 1895 was 10,510, of which 8,285 were men and 2,225 were women. In 1905 the number was 12,810, of which 9,913 were men and 2,897 were women. The number of suicides in every 100,000 of the population in 1895 was 20.2; and in 1905, 21.3. In 1905 the number of suicides in comparison with the total popula-

tion was least in the province of Posen, in Hohenzollern, and in Alsace-Lorraine, where there were 8.8, 11.8, and 11.9 suicides respectively for every 100,000 inhabitants. The lowest figures of self-destruction were, in the west in Rhineland and Westphalia, in the south in Bavaria, and in the east in the provinces of West and East Prussia.

JAPANESE IN GERMANY.—*Ost-Asien,* published in Berlin monthly, represents the Japanese interests in Germany. It contains news of the Japanese colony and articles of special interest to these sojourners in Europe. Among the contents of the February number, for example, is a group photograph of the thirty-two Japanese living in Munich and five pages of the names and addresses of Japanese and Chinese in Berlin and its suburbs, of Japanese in other parts of Germany and of the most prominent among them in other countries of Europe. The visit of the German Emperor to the Japanese Embassy in Berlin is described. Among the leading articles is one on the relations of England and Germany respectively with Japan. A large part of the journal is devoted to news items, including many from Japan.

THE ABNORMAL WEATHER OF THE SUMMER OF 1906 IN ENGLAND.—The *Quarterly Journal of the Royal Meteorological Society,* Vol. XXXIII, No. 141, 1907, contains a discussion by William Marriott, of the "Abnormal Weather of the Past Summer and some of its Effects." Owing to the great heat, vegetable matter became very inflammable, and consequently there were more brush and heather fires than usual. With the advent of the hot weather the death-rate increased considerably, the rate at once beginning to rise when the mean maximum temperature for the week reached 72°. The increase in the death-rate was due almost wholly to the mortality among infants under one year of age, the prevalence of epidemic infantile diarrhœa being the specific cause of these deaths. Milk soured, and became a source of danger to children. An extensive use of canned foods—the usual accompaniment, it may be remarked, of a period of drought when green food is scarce and expensive—tended to produce ptomaine poisoning and diarrhœa. There was a deficiency of grass for cattle, and the milk supply fell off 30 per cent. The brilliant sunshine and warm weather stimulated holiday travel. More visitors than usual went to the various seaside and holiday resorts, and outdoor entertainments were carried on without interruption.

For a study of the effects of a period of drought and high temperatures in this country, reference may be made to a paper by R. DeC. Ward, "Some Economic Aspects of the Heat and Drought of July, 1901, in the United States," BULLETIN OF THE AMERICAN GEOGRAPHICAL SOCIETY, *Vol. XXXIII, 1901, 338-347.*

R. DEC. W.

SURVEY OF THE SCOTTISH LAKES.—The BULLETIN has, from time to time, called attention to the bathymetrical survey of the fresh-water lochs of Scotland, under the direction of Sir John Murray and Mr. Laurence Pullar. During the past four years the survey of 554 of these lochs has been completed, which practically means the end of the survey, except of some small lochs on which no boats could be found. About forty voluntary and paid assistants have been employed during the course of the work, in addition to many boatmen and other workmen. Up to the present time the charts of 180 lochs, beautifully produced by Bartholomew, with descriptive text, have been published in *The Geographical Journal* and the *Scottish Geographical Magazine.* The *Journal* says that arrangements have been made for the publication in its pages during the present year of the descriptions

and charts of the thirty-three lochs in the Ness Basin. This will complete the publication of the observations made in the more important lochs. The results obtained in the case of the remaining 341 lochs will be published as a special volume by the Royal Geographical Society sometime in 1908. Mr. J. G. Bartholomew is now producing the charts for this volume.

SPANISH CARTOGRAPHY IN THE MIDDLE AGES.—The idea seems to be quite prevalent that science, and especially Geography and (as then called) Cosmography, was cultivated in Spain and even introduced into Spain by the Arabs. That the Spanish Moors gave the world several very remarkable geographers and cosmographers is indisputable. We have but to recall the illustrious names of Al Rasis and Edrisi. With the thirteenth century Arabic culture began to decline in Spain, but that decline was not, as sometimes believed, followed by a relapse into ignorance of the Christian Spaniards. On the contrary, at the time when Abulfeda wrote his Description of Spain (mostly copied from Abensaid, who, in turn, copied from Aben-Abdel-Birr), Alfonso X called together the celebrated Astronomical Congress at Toledo in 1252, as a result of which appear the astronomical tables bearing his name, and he wrote himself the ponderous *"Libro del Sabér,"* a compendium of the knowledge of the period, particularly in astronomy and geography. Arab and Jewish men of science attended that Congress also; but anterior to 714 Spain had already its native cosmographers and a specifically Spanish school (as it might be called) of geography and cartography took its origin from Orosius and Saint Isidore. Both are anterior to any Arabic influence. Saint Beatus continued in the same line, and thus, during centuries when the Spanish Christians were most sorely pressed by the Mohammedans, the cultivation of geography and cartography was carried on entirely independent of Moorish influence. In the Boletín of the Madrid Geographical Society, Vol. XLVIII, Señor Antonio Blázquez makes it clear that the system followed by the Arabs is distinct from that observed by their Roman or Gothic predecessors on Spanish soil, and that, while the Arabic execution of maps is more graceful and artistic, the other is superior in endeavours to attain correctness.

The author traces and establishes this continuation of Christian Spanish work in cartography independent from the Arabs through the duration of Moorish preponderance. He also calls attention to another important point—the lack of nautical charts in Arab maps and atlases. These appear in the twelfth century as the work of Catalonians. The credit of these early charts has been claimed for Italy, but it is evident now that they are of Spanish origin. The imperfect manner in which the western portions of the Iberian peninsula, and especially the Atlantic coast, are represented in Moorish and Italian maps, and the lack of data concerning these regions in the geographic literature of Italy and of the Arabs, with the explicit confession, from the time, that neither of these peoples navigated beyond Gibraltar or even reached it, leave no room for doubt. Interesting data are given on the extent of Spanish navigation and commerce in the eleventh, twelfth, and thirteenth centuries. It extended to England at a time when Italian products were hardly known there. Important is, in this respect, the catalogue of Spanish produce and manufactures imported into Flanders in the thirteenth century. The parts of Iberia from which the importations came are specified, and we find enumerated the "kingdoms" of Navarra, Arragon, Castilla, Leon, Andalusia, Granada, Galicia, Portugal, and Majorca.

After the fourteenth century Italian commerce began gradually to supersede the Spanish, and Italian maps and charts became more prominent. But naviga-

tion of the Atlantic and along the African coast remained Spanish and Portuguese. As to the Moors, they never sailed even to the Straits of Gibraltar. The pretended voyages of the Almagrurin and Arab discoveries of the Azores or Canaries must be relegated to the domain of fiction. There is no better proof of it than the Moorish maps and geographic descriptions of the Middle Ages.

On the whole, the monograph by Sr. Blázquez deserves careful attention. It brings to our notice cartographic material hardly known to the public, and assigns the proper dates to much of it. Without in the least becoming offensive, the author establishes the credit due to his country for early achievements claimed, sometimes, by other nations, and in this he only performs his duty.

The accompanying plates are mostly outline copies of the oldest maps and charts, illustrative of the text. They are, of course, in reduced proportions, and in black; hence cannot, and do not, pretend to give an idea of the artistic value of the originals. A. F. B.

OCEANIA.

THE ERUPTION OF MATAVANU IN SAVAII.—The German colonial administration in Samoa sent to Professor K. Sapper of Tübingen a large number of specimens, photographs, and newspaper and other reports, from which he compiled the fullest account that has yet been written of the remarkable volcanic eruption that, in September last, had been in progress for more than a year in the island of Savaii, Samoa. His paper appears in the *Zeitschrift* (No. 10, 1906) of the Berlin Geographical Society. For more than a century the volcanoes of this island had been inactive. Then, in 1902, two minor outbreaks occurred, and a greater eruption began in 1905, which caused much anxiety and alarm. A series of earthquakes between July 25 and Aug. 1, 1905, ushered in the eruption. On the evening of the latter date a loud explosion occurred, and what were called "pillars of fire" were seen issuing from the Matavanu valley, some seven and a half miles from the coast on the northeast side of the island.

This first eruption, though of an explosive nature, was not very violent, as the eruptive material, according to estimates, was not thrown to a height of more than 200 meters, and the hill it formed was not more than 150 meters high. The next phenomenon observed was the flowing of lava on Aug. 9, at first in small quantities and then more abundantly until Dec. 6, when it reached the coast. The flow of lava streams to the sea continued at intervals to the end of September, 1906. Prof. Sapper had received no later reports. In the ten months following the time when the lava first reached the coast, the outflow of lava appears to have been continuous, though varying in amount. It was not accompanied by any high degree of explosive activity.

Dr. Grevel with a party visited the volcano on April 23, 1906, and wrote an interesting account for a local newspaper. The party made the ascent over the crust of the lava stream, which was smooth and easily traversed. The crust was sufficiently cool for the barefooted Samoans to walk upon it without discomfort. At intervals, the solid surface of the lava stream was broken by vent holes. One of these near the crater was at first mistaken for a parasitic cone, as the crust of the lava rose gently to the vent, which was much smaller in diameter than the cavity underneath. The vapours were too thick and sulphurous to permit any sight into this cavity. Large stones were thrown in, but they gave no clue to its depth, as their fall was unheard. Four of these vent holes were examined, each repeating the features of the first on a smaller scale.

The party then climbed to the crater by an easy ascent over the lava flow on the northern side. No view of the crater could be obtained from this point owing to the drift of the south-east trade wind; so the party worked around to the east, where the surface was covered with countless moths, that had been attracted by the crater glow and were killed by vapours rising from cracks in the lava. These vapours had also proved fatal to a flying fox, a dove, and a sea-gull. Finally they moved around to the southern side of the crater, where a good view of it was obtained. It was about 300 meters in diameter. A lake of molten lava, in gentle ebullition caused by rising steam bubbles, filled the crater. While they were there, a gentle flowing of this lava to the north began and the movement of the stream became more rapid, until the lava disappeared in a cataract amid a cloud of steam and probably joined the lava flow over the surface of which the party had ascended.

When the lava reached the sea it flowed out to the coral reef, where its end, being cooled by the surf, formed a wall between which and the coast the lava flowed quietly along the lagoon. The sea was in violent ebullition, dense clouds of steam were rising, and for over 300 feet from the end of the lava flow the surrounding salt waters were boiling hot, and many fish, killed and cooked in this cauldron, were collected and eaten by the natives.

Here and there the lava flowed over the reef into the deep water outside. Wherever this occurred, violent geyser-like explosions marked the progress of the stream. These explosions were due to steam forming under the still liquid lava. The lava was remarkable for its fluidity, and issued in great quantity. The area on the island covered by it extends about 6 kilometers to the west and 12 kilometers to the northeast of the volcano, and has a width of from two to five kilometers. It has filled the lagoon for about eight kilometers along the coast, destroying several villages and rendering others uninhabitable by cutting off their water supply. A number of small promontories of lava were thrust forward beyond the reef.

POLAR.

BELGIAN ANTARCTIC EXPEDITION.—Mr. Henryk Arctowski, the meteorologist of the *Belgica* Antarctic expedition, is now planning to conduct the next Belgian expedition in south polar waters. A committee has been formed at Antwerp for the advancement of his project, and the choice of a vessel for the party is now being considered. According to a report forwarded by Consul-General Diederich to Washington, Mr. Arctowski has explained his plan to the Antwerp Committee as follows:

> My intention is to begin the work of exploration of the antarctic regions at the spot where the *Belgica* (the Belgian vessel which took out the first antarctic expedition under de Gerlache) came out of the ice in 1899, *i. e.*, from 109° longitude west to 160° longitude west, where Edward VII. Land is located. At this point there is a vast unexplored territory which the second Belgian antarctic expedition must cover in order to follow up and complete the discoveries made by Commander de Gerlache on board of the *Belgica*. A little to the south of Edward VII. Land and toward the west is the face of the Great Ice Barrier discovered by Ross. It is from this point that the journey toward the south pole can be started with the greatest chance of success.
>
> There is an immense area of flat glacier ice upon which I should like to use one or two automobiles for journeying toward the south, not in the vain hope of reaching the pole, but for the purpose of tracing the prolongation of Edward VII. Land, and to see if this prolongation extends to Victoria Land, situated about 20° farther west. In this case there must be an immense gulf separating Victoria Land from Edward VII. Land. If, however, the coasts are prolonged without joining, there must exist a wide arm of the sea separating the antarctic zone into two hemispheres.

Dr. Charcot's New Expedition.—We have received from Dr. Charcot a brief statement of his plans for a new expedition to the Antarctic for the purpose of continuing his researches in the Graham Land region. At the explorer's request, a committee was lately appointed by the Academy of Sciences to consider the question, and, as a result of its favourable report, the Academy, on Feb. 4, decided to support his proposals for a second French Antarctic expedition. The following is an outline of the provisional programme:

A vessel will be specially built for the purposes of the expedition, possibly at Dr. Charcot's own expense. The explorer and his companions would proceed in the spring to the site of the rich deposits of fossils discovered by the Swedish expedition at Mount Bransfield and Seymour Island, and, having either returned to Ushuaia (Tierra del Fuego) with the collections or left them at an accessible spot in the region to the south, would, from Wandel Island as a base, extend the explorations carried out during the first expedition to the unknown region south of Loubet Land. The expedition would winter at a suitable spot, making journeys along the coast and into the interior, with a view both to scientific observations and a general reconnaissance of the region to the south. During the following summer the voyage would be resumed according as circumstances dictated. Scientific work of all kinds would be kept up throughout the course of the expedition. Dr. Charcot calculates the probable expense, including the cost of the ship, at not over £30,000.—(*The Geog. Jour.*, Apr. 1907.)

VARIOUS.

The Meteorological Bureau of Sao Paulo, Brazil, is a part of the Geographical and Geological Department. *Bulletin* No. 20 gives in much detail the Meteorological data for the months of June, July, and August last year, with a climatological map for each month.

The Geological Department of Harvard University has received funds for the erection of a seismograph in the University Museum. The instrument will be a Bash-Omori seismograph, with two conical pendulums, one swung in the meridian and the other east and west. The Harvard station will pay particular attention to New England earthquakes and to the geological examination of the recent fault lines along which it is believed that many historically-recorded small shocks have arisen.

The U. S. Geological Survey has prepared a topographical and geological model of Alaska for the Jamestown Exposition. The horizontal scale is about forty miles to an inch, and there is a five-fold exaggeration of the vertical scale. The relief forms and the distribution of economic deposits are shown and also the character and slope of the neighbouring sea-floor.

The Sudan Pionier (1907, No. 3) prints the latest statistics of the Mohammedan population of the world as compiled by Dr. Zwemer. The total number of Mohammedans, according to this traveller and writer on Islam, is 233,000,000, of whom 169,000,000 live in Asia, 59,000,000 in Africa, and 5,000,000 in Europe. The total number living in regions under Christian Governments is 161,000,000. The distribution of Mohammedans according to the languages they speak, is: Indian languages, 63,000,000; Chinese, 31,000,000; African, 32,000,000; Mongolian, 30,000,000; Slavonic, 8,000,000; Persian, 9,000,000; Turkish, 15,000,000; Arabic, 45,000,000. The total number of Mohammedans, among whom no evange-

lical mission has been established, is over 68,000,000, or almost a third of the Mohammedan world.

AMERICAN GEOGRAPHICAL SOCIETY.—A Regular Meeting was held at Mendelssohn Hall, No. 119 West Fortieth Street, on Tuesday, April 23d, 1907, at 8.30 o'clock, P. M.

Vice-President Tiffany in the chair. The following person, recommended by the Council, was elected to Fellowship:

Henry Wellington Wack.

The Chairman then introduced Dr. S. M. Zwemer, who addressed the Society on Eastern Arabia.

Stereopticon views were shown.

On motion, the Society adjourned.

NEW MAPS.

AFRICA.

GOLD COAST.—Northern Territories. (Part of sheet 60.) Scale, 1:1,000,000, or 15.8 statute miles to an inch. Compiled in the Topographical Section, General Staff. Edward Stanford, Agent, London, 1906. (Price, 2s.)

A well-produced map of the Northern Territories of the Gold Coast Colony between Senegal on the north, Ashanti on the south, Togo on the east, and the Ivory Coast on the west. Boundaries are in red, place names and routes in black, water and hydrographic nomenclature in blue, and topography in brown. A great number of routes, villages and hills are shown, but, with the exception of the international boundary surveys, no part of the region has been accurately surveyed. The positions of rivers, villages and hills are therefore only approximate. This is a sheet of the excellent map of Africa on a scale of 1:1,000,000 that Great Britain is producing, which will be of great value for many purposes until it is supplanted by complete surveys.

GAMBIA.—Gambia. Reproduced from the work of the Anglo-French Boundary Commission, 1904–1905. (Two sheets.) Scale, 1:250,000, or 3.95 statute miles to an inch. Compiled in the Topographical Section, General Staff. Edward Stanford, Agent, London, 1906. (Price. 2s.)

The international boundary and the position of the boundary pillars, many of which were planted at intervals of about two miles, are shown. The scale permits the introduction of a large amount of cultural information, such as native paths, all the huts in small villages, rice and other farms, besides forest and swampy areas, etc.

SAHARA.—Progrès de la Pénétration Saharienne—1830–1906. In "La Pénétration Saharienne (1830–1906)," by Prof. Augustin Bernard and N. Lacroix. Algerian Government, Algiers, 1906.

The monograph which this sheet illustrates is an instructive account of the history of exploration in the regions of Algiers and Tunis and the Sahara to the south of

them from 1830 to the present time. The sheet contains a series of six maps showing, in colours, the progress of exploration and surveys in 1830, 1852, 1864, 1881, 1900 and 1906. The true positions of many places erroneously indicated on the first four maps are shown in red. The sheet graphically shows by what slow stages the Sahara was penetrated and also that, outside öf Algeria and Tunis proper, by far the larger part of the exploratory work has been carried out since the present century began.

AFRICA.—Anteil der Schweizer an der Erschliessung und Erforschung Afrikas. Scale, 1:30,000,000, or 473.4 statute miles to an inch. *Neujahrsblatt* of the Natural History Society of Zürich, No. 106, Zürich, 1906.

Five regions coloured red show the areas in which the Swiss have figured in African exploration. They include Liberia, territory fronting on the Gulf of Guinea, German Southwest Africa, Portuguese East Africa and the Transvaal and a large district in Eritrea. It seems as though the ethnological and linguistic studies which Héli Chatelain carried on in Angola might entitle him to inclusion in this group of Swiss scientific labourers who have made Africa their field. The map illustrates a monograph by Prof. Dr. Hans Schinz.

THE ATLAS LANDS.—Verteilung der mittleren jährlichen Regenmenge im Atlasgebiet. Scale, 1:7.500,000, or 118.3 statute miles to an inch. *Jahresbericht* of the Frankfort Geographical and Statistical Society, 1905–1906, Frankfort on Main, 1907.

Accompanies a monograph of 87 pp. on precipitation among the lands of the Atlas mountains by Dr. Karl Knoch. Ten tints show the distribution of rainfall in the Atlas lands and the neighbouring regions of the Sahara from the Atlantic to the Gulf of Gabes. A transparent sheet, coloured to show the distribution of forests, cultivated lands, steppes, and desert, is supplied to be placed over the rainfall map, thus graphically showing the relations between the distribution of vegetation and rainfall.

CAPE OF GOOD HOPE.—Geological Map of the Colony of the Cape of Good Hope. (Sheets 2, 4 and 45.) Scale, 1:238,000, or 3.7 statute miles to an inch. Geological Commission, Cape Town, 1907.

Sheet 2 embraces the area lying between 33° 40′ and 34° 50′ S. Lat. and 20° and 21° 15′ E. Long., or east of the area covered in sheet 1. Sheet 4 covers the area between 32° 40′ and 33° 40′ S. Lat. and 17° 45′ and 20° E. Long. or the region north of sheet 1 as far as St. Helena Bay. Sheet 45 comprises the area between 27° 40′ and 28° 40′ S. Lat. and 22° 45′ and 24° S. Lat. in Griqualand West, to the northwest of Kimberley. Mr. A. W. Rogers describes the Campbell Rand and Griquatown Series, shown on this sheet, and their relation to older and newer rocks, in the *Transactions* of the Geol. Soc. of S. A. (Vol. IX, 1906.)

On all sheets geological formations are shown in colour, and the position of faults and inclined, horizontal and vertical strata are indicated.

EAST AFRICA PROTECTORATE.—Sketch Map of the East Africa Protectorate, Scale, 54 statute miles to an inch. Prepared by the Public Works Department, Mombasa, 1906.

This map, which accompanies the edition for 1907 of the "Handbook for East Africa, Uganda and Zanzibar," contains much new information relating to the new boundaries of the provinces, the game reserves, particularly large in the north and south central regions, etc. The position of the Masai Reserve, to which this tribe is now confined, is indicated.

AMERICA.

U. S. Geological Survey Maps.

United States.—Map Showing Structure and Economic Geology of Kittanning and Rural Valley Quadrangles. (In pocket.) Scale, 1:62,500, or 0.9 statute mile to an inch. U. S. Geological Survey, Washington, 1906.

Illustrates *Bulletin* No. 279 on "Economic Geology of the Kittanning and Rural Valley Quadrangles, Pa.," by Charles Butts. Over 1,000 places at which coal was observed duriug the field work are numbered with reference to the descriptive text. The geological data are imposed upon the topographic sheets. Coal basins are defined, and the position of oil and gas wells is given.

United States.—Map of the Yampa Coal Field, Routt County, Colorado. Scale, 1:125,000, or 119 statute miles to an inch. By N. M. Fenneman and H. S. Gale. *Bull.* 297, U. S. Geol. Sur., Washington, 1906.

This map (in pocket) illustrates a monograph on the Yampa Coal Field. The maps of this region have not been based upon surveys of great accuracy, and accordingly this base map was prepared by means of plane table traverses controlled by trigonometrical sights to mountain peaks used by the Hayden and the Fortieth Parallel Surveys. Distances were measured by counting the revolutions of a buggy wheel and altitudes determined by aneroid barometer.

U. S. Hydrographic Charts.

Pilot Chart of the North Atlantic Ocean, April, 1907.

Pilot Chart of the North Pacific Ocean, May, 1907.

North America.—Stanford's New Orographical Map of North America. Scale, 1:6,013,500, or 94.9 statute miles to an inch. Compiled under the direction of H. J. Mackinder. Edward Stanford, London, 1906. (Price, in four sheets, 16s.; mounted on rollers, 20s.)

This orographical wall map of our continent, intended for school use, belongs to the series in which Europe, Africa, Palestine and Asia have appeared. Shades of brown and blue are used to differentiate the forms of the land and the sea floor. The colour scheme is well handled, the selection and editing of the material are excellent, and the product is to be commended as one of the best school maps depicting the physical features of North America that have been produced. A later edition will probably include the Death Valley region, as well as the Salton Sink, as an area lying below sea-level.

United States.—Preliminary Geological Map of Connecticut. Scale, 1:250,000, or 3.95 statute miles to an inch. By H. E. Gregory and H. H. Robinson. Hartford, 1907.

About forty symbols, in colours, are used to show the formations. The base map is the topographic map of 1893. Only bed-rock formations are represented, the cover of till, stratified drift, lacustrine deposits, etc., being entirely omitted. The drawing of accurate geological boundaries is, in many cases, made impossible by (1) the mantle of drift which frequently covers all contacts and (2) the evident gradation between adjoining formations. The map is not presented as a final or complete production; its aim is rather to bring together the scattered geological data which have been accumulating since the publication of Percival's map in 1842. The map is accompanied by *Bulletin* No. 7, which acknowledges the material used, explains the map and gives a summary of the geological formations.

NORTH AMERICA.—Linguistic Families of American Indians, North of Mexico. Scale, 240 statute miles to an inch. Bureau of American Ethnology, Washington, 1907.

This is a reproduction of Powell's map to illustrate Part I, just published, of the "Handbook of American Indians North of Mexico," which appears as *Bulletin* 30.

CHILE.—These charts, on a scale of 1:250,000, or 3.9 statute miles to an inch, have been received from the Comisión Chilena de Límites, Santiago:

TIERRA DEL FUEGO.—Between 54° 50′ and 55° S. Lat. and 68° 40′ and 69° 30′ W. Long. Includes the region between the Rio Grande and Beagle Channel. Much detail is given of the known parts of this area.

MAGALLANES.—Between 51° 50′ and 52° 50′ S. Lat. and 69° 30′ and 71° 30′ W. Long. Includes the eastern part of the Strait of Magellan, and shows the regions of sheep farming in southern Patagonia and northern Tierra del Fuego.

ATACAMA, COQUIMBO.—Between 29° 30′ and 30° 30′ S. Lat. and 69° 30′ and 70° 30′ W. Long. All the sheets show the boundary as now defined between Chile and Argentina, and are accompanied by sheets showing details of the trigonometrical surveys on which the charts are based.

CHILE.—Costa de Chile, Arica. Scale, 1:20,000, or 0.3 statute mile to an inch. Oficina Hidrográfica, Valparaiso, 1906.

A black-and-white chart showing a street plan of Arica, elevations along the coast and soundings for several miles north and south of the city extending two to four miles out from the shore. Soundings are in meters.

CHILE.—Canales Mayne i Gray. Smith Canal. Scale, 1:30,000, or 0.47 statute mile to an inch. Oficina Hidrográfica, Valparaiso, 1906.

Surveys executed in 1904 in the Smith Canal region just north of Magellan Strait between the islands and the mainland. Many soundings and altitudes in meters.

ASIA.

TAIMYR PENINSULA.—Anchorages on the Northwest Coast of the Taimyr Peninsula. Surveyed by the Russian Polar Expedition under Baron Toll in 1900-1901. Central Hydrographic Division, Ministry of Marine, St. Petersburg, 1906. (In Russian.)

This sheet contains five black-and-white charts representing: (1) The entrance into Middendorf Bay, scale, 1:61,404; (2) Valter, Zeeberg, and Chernishev Bays, scale, 1:219,240: (3) Zaria roadstead, scale, 1:36,540; (4) Kolomeizev Bay, scale, 1:35,540; (5) Northern Bay in the Gulf of Birula, scale, 1:73,080. Anchorages, soundings, coastal contours and topography are indicated.

EUROPE.

BLACK SEA.—Chart of Jubska Bay. Black Sea Hydrographic Expedition of 1886. Central Hydrographic Division, Ministry of Marine, St. Petersburg, 1904. (In Russian.)

A black-and-white chart showing the survey in much detail of Jubska Bay on the northeast coast of the Black Sea southeast of the port of Novorosseisk.

FLANDERS.—Carte Générale de la Flandre. Scale, 1:500,000, or 7.8 statute miles to an inch. Librairie Armand Colin, Paris, 1906.

An extract from the map of France on the above scale, published by Le Service Géographique de l'Armée, to illustrate the volume "La Flandre," a geographical study by Dr. Raoul Blanchard. The map includes the entire Flemish plain in France, Belgium and the southern part of the Netherlands.

NORWAY.—Kart over Norske Jordskjaelv, i Aaret 1905. Scale, 170 statute miles to an inch. By Carl Fred. Kolderup. Bergens Museums, *Aarbog*, No. 1, 1906.

Shows the distribution of the 23 earthquakes observed in Norway in 1905. They were all feeble in character. Most of them were merely local, though the effects of those occurring on Jan. 29 and Feb. 6 were felt over a somewhat larger area. The larger number occurred in southeastern Norway; but nine were scattered along western Norway, where earthquake movement is not infrequent. The centres of disturbance are marked with numbers which refer to description in the text.

ATLASES.

ATLAS OF THE WORLD'S COMMERCE.—Compiled from the latest official reports at the Edinburgh Geographical Institute. Edited by J. G. Bartholomew. (Parts 20, 21, and 22.) George Newnes, London, and Frederick Warne & Co., New York. (Price per Part, 25 cents.)

These three parts complete this important publication. The Mercator charts in Part 20 show the commercial highways of the world, with railroad, steamship, and caravan routes in red and navigable rivers in blue, the lands being tinted to indicate elevation above the sea; fish oils, showing the areas yielding the various kinds of oil; distribution of hides and skins, countries producing them, regions with surplus for export and centres of the leather industry; the distribution of dyeing and tanning materials, with exporting countries coloured. In Part 21, distribution of forms of cultivation, etc., ocean surface temperature, January, July and mean annual temperatures, distribution of vegetable oils, opium, drugs, etc. In Part 22, distribution of British export and import trades, coloured according to value, distribution of ivory, gums, resin, wax, etc. Many diagrams are also given, the "Commercial Gazetteer of Countries and Ports of the World" is completed, and the list of the principal world travel routes is given.

The atlas includes 176 large pages of coloured plates, containing over 1,000 maps and diagrams. The work is the most successful attempt yet made to summarize, in cartographic form, the facts and principles of economic geography. There must, of course, be shortcomings and defects in such a compilation, because the commercial statistics supplied by the various countries are of very unequal merit and data are entirely lacking for some parts of the world. As far as available material permits, however, this atlas supplies a great want in our commercial edueation and will be a boon to students of commercial geography.

GENERAL.

OCEAN.—Übersicht der Ergebnisse der Lotungen der Deutsche Niederländ. Telegraphgesellschaft. (1) Zwischen Shanghai und Yap; (2) zwischer Menado-Palau-Yap-Guam. Scale, 1:9,240,000, or 145.8 statute miles to an inch. *Annalen der Hydrographie*, Heft 3, 1907, Hamburg.

These surveys were made by the German Government steamer *Edi* in 1903 and the cable-laying steamer *Stephan* in 1905. Figures for depths are given in hundreds of meters, and isobaths indicate the sea-floor from depths less than 200 to more than 9,000 meters. Along the line Menado (Celebes)-Yap-Guam there was found to be unusual diversity in the forms of the lithosphere. Islands, sandbanks, and trenches, as oceanographers call long but narrow depressions with steeply-sloping borders, rapidly succeed one another. The discoveries recorded in the chart are fully described in the accompanying letterpress by Dr. G. Schoot.

BOOK NOTICES.

Laird & Lee's Vest-Pocket Littré-Webster Dictionary. English-French and French-English. By Max Maury. 290 pp. Laird & Lee, Chicago, 1899.

This little lexicon gives 60,000 words, meanings, and idioms, discusses French pronunciation, and summarizes French grammar. Its aim is to supply the public with a practical interpretation of French for every-day use, including all the more common idioms. It also contains conversion tables for Fahrenheit and centigrade temperatures, and for American and metric weights and measures.

China and Methodism. By James W. Bashford. 118 pp. Jennings & Graham, Cincinnati, and Eaton & Mains, New York, 1906. (Price, 35 cents.)

Half of this booklet is given to an account of the land, the people and the religions of China. Many missionary writings have geographical value because their authors frequently possess an intimate acquaintance with the geography and people of little-known lands. This small volume, while dealing largely with missionary effort, has geographical interest. The author attributes to a geographical reason the fact that Szechuen Province more strongly opposed foreign missionaries than most other provinces of the Empire. It takes a traveller ten days to ascend the Yangtse from Shang-hai to Ichang, thirty days to reach Chungking, the commercial metropolis of Szechuen, and fifty days to reach Chentu, the capital of Szechuen. The enormous difficulty of reaching the province prevented the people from seeing many foreigners, and they were naturally timid and fearful of the effects of the foreign religion. Tragical incidents of the Boxer uprising are narrated, and some of them show how bravely Christian converts suffered martyrdom rather than deny their faith.

The Tourist's India. By Eustace Reynolds-Ball. xii and 364 pp., 28 Illustrations, Map, Appendix, and Index. Swan Sonnenschein & Co., London, 1907.

This is not a guide book in the usual sense, but a popular sketch of the topographical, archæological, historical, and social aspects of the great show cities and tourist centres of India. The author has confined his attention to the regions which the tourist frequents, and what he says of them is readable and often picturesque. He regards India as quite unsuited to a tourist possessed of a highly nervous and emotional temperament:

> The trying fluctuations of temperature, and the inevitable discomforts and petty worries of travel, will in great measure neutralize the good effects of a sunny and genial winter climate.

With the exception of the fashionable hill stations, Simla, Darjeeling, and others, there are not a dozen hotels in India which would rank as first class according to the European standard. The only thing that can be said for them is that the charges are moderate. Perhaps the marked development of the tourist traffic will effect a general change, as it has already done at Bombay, where the leading hotel, recently completed, is a magnificent building and thoroughly modern.

The letterpress does not lack allusion to the relations between the natives and the European residents. In Bombay, for example, the rich Parsee merchants give many balls and receptions, which are by no means tabooed by the Europeans, but are never returned. As Clement Scott wrote:

> These highly educated, extremely intelligent Parsee ladies and gentlemen constitute the race whose lavish hospitality is accepted by Europeans, but by some mysterious unsigned order must never be returned. Thus you can play cricket with a Parsee gentleman, but you must not bring him back to dinner.

The magnificent view of Kunchinjunga, which Sella caught on his camera at Darjeeling, was, according to this writer, a happy chance, for the tourist only occasionally enjoys this glorious mountain view. A series of undulating, rounded hills extends for forty miles and, in bright weather, carries the eye to the magnificent group of snow summits of which the long crest of Kunchinjunga, the second highest mountain in the world, forms the centre and crown. On those rare days when the atmosphere is perfectly clear, the snow and ice fields seem but a few miles off, though they are forty or fifty miles away as the crow flies.

The author speaks with disrespect of the term "the Alps of Asia," which has been applied by some writers to the Himalayas. He reminds his readers that the Himalayas are to the Alps what these mountains are to the Welsh hills. Any one who makes the tour of India will profit by reading this book.

The Voyages and Explorations of Samuel de Champlain (1604–1616), narrated by Himself. Translated by Annie Nettleton Bourne. Together with the Voyage of 1603 reprinted from Purchas His Pilgrimes. Edited with Introduction and Notes by Edward Gaylord Bourne. (The Trail Makers.) 2 vols. New York, A. S. Barnes & Co., 1906.

Twenty-two years ago the late Dr. Adolf Bastian, then Director of the *Museum für Voelkerkunde* at Berlin, said to the writer, who was admiring the splendid work of Reiss and Stuebel on Ancon: "This is all very well, but it is not what we really need. Our branch of science (referring to ethnology) must be made accessible to the people, and costly as well as bulky editions do not fill the bill. Books of convenient size with illustrations, plain but correct, books that can be obtained at a moderate expense, appeal to the student with limited means who can own them, and thus have them constantly at his command. Whenever necessary for special reasons he will find the elaborate works in public libraries." What the veteran German anthropologist said in regard to anthropological publications adapts itself with equal truth to reprints or translations of rare and important sources of history. The tendency of the day is towards stately outputs, luxuriously illustrated and very expensive, and the interested reader or student who is not within reach of large libraries cannot consult them; besides, they are irksome to handle.

For several years the firm of A. S. Barnes & Co., of this city, has successfully striven to furnish the public with reprints or reliable translations of rare and early sources of North American history and geography. The "Trail-Makers" are somewhat after the style of the Hakluyt Society's publications. Only they are more convenient and, generally, better edited. They are, in fact, pocket editions of valuable sources. By this series a great service is rendered, for it enables many a reader to consult the original documents, and thus to form an independent opinion. The last two volumes of the "Trail-Makers" are before us, and they are of special interest to the people of our Northeast. Samuel Champlain is a household word in our history.

The first volume contains the first three books of Champlain's narrative after the edition of 1632, translated from the French by Mrs. Bourne, wife of the editor; the second embodies the fourth book and a reprint of Purchas' (*His Pilgrimes*) narrative of Champlain's voyage of 1604. It is needless to go over the ground covered by these well-known documents.

Neither is there much to say in regard to the introduction by the editor, Professor Bourne, and to the footnotes accompanying the text in both volumes. Mr. Bourne's name is a guarantee for unusual thoroughness and acquaintance with his subject. Like everything emanating from his pen, it is most creditable. We can only congratulate Mrs. Bourne on her translation, which is an excellent rendering of the French original.

A photographic fac-simile of Champlain's map of New France, from the edition of 1632, forms the frontispiece of the first volume. A. F. B.

Chili et Bolivie. Étude économique et minière. Par Ferdinand Gautier, Ingénieur Civil des Mines. E. Guilmoto, Paris (1906).

There are many things in this book commendable, but it is also disfigured by many errors, and errors that ordinary care in observing would have avoided. It is, for instance, absolutely impossible to see any smoke issuing from the tall summit of the Sajama in western Bolivia; that gigantic pyramid (22,000 feet, at least) has not given any signs of activity for centuries. The same can be said of the peaks of Tacora, which belong to the same range. The Sajama *was* once active; now it is dormant, if not extinct. The Huayna Potosí in Bolivia is not "on the flanks of the Nevado de Sorata," but far to the south of it, separated by mountains that exceed 20,000 feet in altitude. The copper mines of Corocoro are, notwithstanding Mr. Gautier's statement to the contrary, systematically and continuously worked; the Chilian Company having penetrated as low as the level of 1,500 feet beneath the surface. The extensive tin mines at Huayna Potosí, although operated by a French company, are not mentioned as such. Mr. Gautier denies the existence of the Permian formation in the Bolivian highlands, whereas it constitutes a considerable proportion of the surface rocks of the Puna west of La Paz. He states, that the Permio-Carboniferous is not found. The coal on Titicaca Island and on the peninsula of Copacavana pertains to that group. It will also be news to those who know Lake Titicaca to read that its water is —*not*—brackish! Such and similar gross misstatements about Bolivia are calculated to inspire a certain apprehension that Chile may not have fared better at the hands of the author. It appears, however, that he is better acquainted with that republic; and while there are mistakes, they are not as startling as in the case of Bolivia.

Fully three-fourths of the book are devoted to Chile. Considering the much greater importance of that country, its far greater development in every respect, the proportion is fair. Bolivia is only beginning to enter the path of progress in which Chile is making such rapid strides. It is gratifying to notice that the latter, after having deprived Bolivia of her coast-line by war, is now proposing to assist her in establishing railway communications with that coast; in the guise of indemnity for what was forcibly taken. It is a wise policy, beneficial to both countries, and cannot fail to foster harmony and cement friendship between nations too long kept apart through the recollections of former strife.

Three rather insignificant outline maps give a superficial idea of Chile and the parts of Bolivia adjacent to it. A. F. B.

L'Europe (moins la France) au début du XXe Siècle. Par M. Fallex et A. Mairey. Ch. Delagrave, Paris (1906).

An unpretentious octavo, of convenient size for consultation, illustrated by many characteristic landscapes and human types and with maps intercalated in the text, exhibiting the different parts of Europe under their physical, historical, commercial and industrial aspects. France is omitted, as stated in the title. To the reader who is not a native of that country, this appears regrettable, for a comparison of France with the other European countries and nations, from the standpoint of the authors, would be interesting. The book might, were it not for this omission, prove an excellent geography for secondary schools. It is an imitation of the German text-books, that are of such great value for educational purposes, and deserve to be imitated everywhere.

It is sufficient to state, that the book begins with northern Europe, after a good and ample general introduction. First come the British Isles, then the Scandinavian peninsula and Denmark, Russia, the Alpine region, Austria-Hungary, the German Empire, Holland, Belgium, the Iberian peninsula and Italy; the Balkan peninsula being at the end. The space allotted to each is fairly in proportion with its extent and importance and the treatment objective and generally fair. Spain alone might have been spared the terms in which the very short retrospect of its history, from the fifteenth century on, is dismissed. The term *rossée*, for instance, applied to the ultimate outcome of Spain's enormous political and geographical expansion, is altogether too trivial for the slow downfall of a mighty Empire, and would better fit France and the manner in which she lost her American colonies. Neither is *"berné"* fully in place. Geographers should not descend to the use of such terms. The book is a serious one and demands dignified language.

Inconsiderable errors are found, though but rarely, and it is not worth while to dwell upon them. A. F. B.

Geschichte von Japan. By O. Nachod. Vol. I, Book I: Die Urzeit (bis 645 n. Chr.). Gotha, 1906. In: Allgemeine Staatengeschichte herausgegeben von Karl Lamprecht. 8vo. xxix and 426 pp.

This is the first attempt at a critical exposition of the history of Japan, based on all available sources made accessible through translations into European languages. The book is essentially of an analytical character, giving in lengthy footnotes extracts from the works consulted, as well as the varying views of the different authors. It thus presents a most thorough and useful text and reference-book for the historical student, but is by no means easily digestible reading. The author's attitude towards his authorities and the opinions of Japanese scholars and foreign Japanologues is that of a cool, sober, objective criticism, and never in radical opposition to established doctrines; he seldom commits himself to any judgment of his own, and rather stands under the sway of his material than rises with a free mastery above it. To some this will appear a commendable feature, to others a weakness. Altogether, a more personal element, and greater vigour in the discussion of conflicting views, would have been more advantageous, inasmuch as it would have lent to the book a tinge of individuality. The book, although of the highest rank as regards philological and historical accuracy, and deserving the name "wissenschaftlich" to the fullest extent, thus is lacking in originality and in original and productive criticism. The author depends too much on what his authorities say to see his way clearly through the problems themselves, and to

investigate them for himself independent of his predecessors. This becomes quite evident in the second chapter, where he deals with the question regarding the origin of the Ainu and Japanese, and confounds the notion of "race" as a physical type with that of "people" as a culture community. I do not know that any serious anthropologist has ever accepted the unfounded theories of Bälz, which Nachod, strangely enough, characterizes as sharp-witted (p. 37). Whatever Bälz or other physical anthropologists claim to have ferreted out in regard to the modern occurrence of physical types among the Japanese, it can shed no light on the provenience and migrations of the Japanese as a people, or on the origin of their culture. The racial and cultural aspects of the problem are two fundamentally distinct subjects. Ancient Japan as a type of culture has nothing whatever to do with Siberian or Korean cultures, but points decidedly in the direction of southeastern Asia, among the multifarious tribes of which many of the prominent features of Japanese culture have existed in striking coincidences since ancient times. Nachod, in his work, has not exhausted all the archæological material available, but has relied chiefly on Gowland, whose views will have to be modified to some extent. American readers will painfully miss the name of Romyn Hitchcock, one of the most deserving students of the archæology of Japan, and a reference to Edw. S. Morse's beautiful Catalogue of Japanese Pottery. Contradictions of greatest consequence in his authorities are sometimes left unnoticed or uncommented on by the author. Thus, on p. 45 he quotes from Gowland:

> that the discoveries of the bronze swords and the moulds for casting them, would seem to support the view that they were then in the last stages of their bronze age;

while on p. 145, note 4, the following citation from the same author occurs:

> In my explorations and studies of the remains which occur in the ancient Japanese dolmens and chambered tumuli, I have always observed a marked scarcity of castings of bronze.

The fact is, that there is no justification whatever in speaking of a bronze age in Japan, in conformity to strict archæological terminology, because the ancient Japanese lived in an iron period, during which material of raw bronze and worked bronze pieces, especially mirrors, were imported from the mainland. Space forbids entering into a discussion of this and many other details.

Nachod's criticism of the oldest Japanese "historical" works can be accepted without objection; but I do not agree with him in seeing actual events in the alleged conquest of the main island through Jimmu (pp. 68-69) and in Empress Jingō's expedition to Korea (p. 70)—accounts which are just as legendary and fabulous as the traditions regarding the age of the gods. He underrates far too much the value of the Chinese sources regarding Japan (p. 88), which are the oldest on record, and which, if correctly translated and interpreted, will doubtless yield results of great importance. There is no reason whatever for Nachod's taking umbrage, as he does (pp. 88, 142), at the statement in the Annals of the Later Han Dynasty, that all Japanese practised tattooing in that period, which can be but an ancient custom, considering its prevalency as a deep-seated ethnic trait, and also well attested by representations on ancient clay figures. It is to be regretted that he could not avail himself of Aston's new book on Shintō, of Revon's Le shintoisme, and of the works of G. W. Knox, that he might have avoided some fundamental and widespread mistakes, like the belief in the existence of ancestral worship in ancient Shintō (pp. 105, 112). This common error is chiefly due to the dissertation of N. Hozumi's "Ancestor-Worship and Japanese Law" (Tokyo, 1901), in which this subject is treated with a most ingenious misrepresentation of facts and perversion of logic. Aston has now exploded this

view; and Knox, in his "The Development of Religion in Japan" (p. 27) asks justly:

> How, indeed, could there be any ancestor worship when the family was only in the forming, and when family names were unknown?

Most interesting is the study of the ancient national character as inferred by him from historical passages (pp. 390 *et seq.*). Nachod arrives at the conclusion that the contradictory double tendency of the soul of the Japanese, still emphasized by modern observers, reveals itself in the early historical period—a medley of good-naturedness and hard-heartedness: on the one hand, inoffensive cheerfulness and exuberant enjoyment of life; on the other hand, solemn gravity and extreme disregard of one's own life and the lives of others, not seldom combined with malicious cruelty. The pages of Japanese history teem with most repulsive narrations of ruthless and barbarous acts on the part of emperors and nobles (see the long list on p. 236), and the chapter of imperial "crazes" is sadly enriched by the descendants of the sun-goddess. After all, it was only the mitigating influence of Buddhism and Confucianism which turned the Japanese of old from dull savages into a civilized social body. Knowledge of the history of Japan has spread but little among our public; and a study of its very oldest epoch under the guidance of a work of research like that of Nachod affords a better clue than anything else to a correct understanding of the Japanese people of the present time.

Of all previous books on the history of Japan, the present one has the great advantage of being thoroughly trustworthy in the facts which it submits, and of dealing intelligently and conscientiously with a most difficult portion of history, and one that presents an almost desperate task to any historian. At our universities it could be well employed as a text-book in the hands of students, the more so as quotations from English sources are kept throughout in the original. We look forward to the continuation of the work with great expectation.

B. L.

China and Religion. By Edward Harper Parker. New York: E. P. Dutton & Company, 1905. xxvii and 317 pp. 12 Plates.

The religious history of China presents a unique spectacle, in that all the great religions of the world have found a hospitable shelter within her domain, and even flourished there at one time or another. The teachings of Confucius and Laotse were nourished with indigenous beliefs, and may have even taken their starting-point from a common source. Then Buddhism came victoriously from India, and ever held a firm grasp over the minds of the masses. Persia contributed the doctrine of Zoroaster with the worship of fire; Manicheans and Nestorians introduced Christianity from Western Asia during the Middle Ages. Islam has won a great number of adherents, and Judaism made its appearance through a small immigrating colony of Indian Jews. Catholicism, Protestantism, and the Russian Orthodox Church were the last guests to take their seats in this international symposium. It is from this point of view—the historical aspect—that the various phases of religious life in China are expounded in a brief and thorough, matter-of-fact way in Mr. Parker's book, which is founded on his wide range of reading in Chinese literature, and on numerous critical papers formerly published by him in the course of many years. What we miss in the book is an exposition of Lamaism, which, ever since the days of the Mongol dynasty, has played a certain rôle in China, and was still upheld by the emperors of the reign-

ing house for political reasons. Another subject which the book lacks is a treatment of Siberian shamanism, which not only swayed the court of the Mongol rulers, but also still permeates the imperial cult of the Manchu dynasty. The last chapter is taken up with an interpretation of certain sides of Shintoism, which is quite out of place in a book dealing with the religions of China, but which is very welcome nevertheless, as the author makes some exceedingly good points in it. What Parker says about the religious tolerance of the Chinese (p. 6), deserves unlimited indorsement:

> The Chinese Government has always been one of the broadest-minded and the most liberally inclined towards pure religion; it has never persecuted to the merciless and cruel extent once so common all over Europe; and when it has seemed to persecute at all, it has really only defended what it honestly believed to be its own political rights: it has never encouraged religious spite, mental tyranny, or the stifling of any free opinion that keeps clear of State policy, scandal, or libel.

What the author sets forth of Taoism and Confucianism is a fresco sketch in terse, epigrammatic style, contrasting the two systems in their salient points; but he does not show the inner connection of Taoism with the present popular religion, nor the interesting development of Confucianism into the State religion; nor are there any allusions to the peculiar imperial worship. It is strange that the important researches of Edkins and de Groot have not been utilized in the book. The difference between Laotse and Confucius is characterized with the words that the former was "a rugged, radical denouncer of the Jeremiah or Carlyle type," the latter "a man of comfort, order, reverence, and courtliness" (p. 31). Mr. Parker is quite right in looking upon primeval Taoism as the purest expression of Chinese religious thought and a strong intellectual and moral force in educated China. In the famous visit of Confucius to Laotse he is inclined to see an historical fact; while other scholars, like Chavannes, consider it as a mere allegory created by later popular imagination. A complete translation of the Tao-têh-king, in which Laotse's teachings are laid down, is given in an appendix.

The more interesting portions of the book are the chapters relating to the foreign religions in China,—Parsism, Manicheism, Nestorianism, Islam, and Judaism. It is a matter of regret that, in dealing with the religion of Mânî, Mr. Parker has not made use of the work of Dr. Müller, who, in 1904, deciphered many fragments of Manichean literature discovered by Grünwedel on his expedition to Turfan. The remark on p. 113—that "the very Chinese word for *Mâni* is borrowed from the earlier Chinese word used for the Buddhist *mani,* or 'spotless' (as in the words *Om mani padmê hûm* of Tibetan Buddhism)"—is not to the point. The two designations are quite independent of each other. The latter *mâni* is a genuine Sanskrit word, with the meaning of "jewel;" while Ma- (or Mo-)ni is a Chinese transcription of the foreign name of Mânî, the founder of Manicheism.

On p. 142 Mr. Parker speaks of the oldest Mohammedan inscription of China, dated A. D. 742, and stating some of the facts about the earliest penetration of Islam into China. "But no one," he continues, "has yet come forward to say that he has himself seen such alleged tablet; nor can any of the Europeans who allude to it give any better authority for their statements than the very modern (and only) Chinese works devoted to a study of the Mussulman question, none of which date farther back than 1651, and all of which bear evidence of defective or imaginative workmanship." I myself saw and inspected the tablet in question while at Hsi-an-fu in the summer of 1903, and procured a rubbing of the inscription, from a study of which I am fully convinced of its authenticity. If

the author says on p. 162 that the Koran does not seem to have ever been translated into Chinese, it should be remembered, of course, that the Koran has never been translated into any foreign language by the explicit command of Mohammed, and must be read in the original Arabic by all the faithful.

His consideration of the history of Catholic and Protestant missions he concludes with the remark:

> It is regrettable to see what emphasis continues to be laid in ghostly circles upon the distinction between Protestants and Roman Catholics. Both sides are in China equally to blame in this respect; and the fact that two religions, derived from one and the same source, continue to wage an inveterate, if smothered, warfare one against the other abroad, is a poor example of Christian charity to offer to a sceptical people, who, as we have seen, have had freely offered to them for inspection every Turanian, Aryan, and Semitic religion in turn. When to this religious quarrelsomeness is added the political greed of the Christian powers, small wonder if Japan, without any Christianity at all, succeeds in morally gaining the upper hand.

If, to speak with Schiller, the world's history is the world's judgment, religious history is no less the judgment of religions.

In regard to Japanese Shintō, Mr. Parker makes a new and interesting suggestion (p. 251):

> Shintō is a purely Chinese notion, not only as a specific word (having a specific meaning in the Chinese classics, which meaning corresponds both with the most ancient Chinese and with the most modern Japanese ideas), but also as a general philosophic term, which is so used at all stages of its discussion by the Japanese as to prove that such definite philosophical ideas as the Japanese have ever had are all founded on the "Book of Changes," the "Book of Rites," and the pure Taoist philosophy.

This observation, in general, is undeniably correct, Chinese influence being already revealed in some of the legends and customs of primeval Shintō, and the stream of philosophic thought with which it was later imbued being purely Chinese. Even the ascribing of victory by the Japanese "to the virtues of his Majesty" is a stock Chinese custom and a stock Chinese phrase, as Parker well illustrates (p. 259). But the sentence on p. 269, that "there is not a single instance in Chinese history of a sustained, noble, generous, and brave patriotic movement," is rather too sweeping. Need we remind Mr. Parker of men like Tsêng Kuo-fan, Tso Tsung-t'ang, or the censor Wu K'o-tu? Also in the older and modern system of Bushidō, contrary to his opinion, the influence of Chinese institutions is apparent: the Japanese harakiri finds its counterpart in the honorary suicides, and in suicides from the motive of protest, in China, and Korea; the psychological basis being the same in both cases, and the difference being only in the form of execution of the act or in the means selected to effect the suicide. Also the Chinese had their age of chivalry and their loyal and revengeful knights in the period of the Three Kingdoms; and it remains a question open for investigation as to how far China has been active in influencing Japan in this direction.

B. L.

Klimakunde. I. Allgemeine Klimalehre. Von W. Köppen. 12mo. 2d ed. Leipzig, Göschen, 1906. Pp. 132, pls. 7, figs. 2.

We are glad to notice the publication of a second edition of Dr. Köppen's excellent little book on Climatology, the first edition of which was dated 1899. The title has been changed from *Klimalehre* to *Klimakunde,* and we note also the prospect of a second part, as indicated by the designation of this volume as *I. Allgemeine Klimalehre.* The additions to the new edition are as follows: Section 3 is a new one. It gives a useful summary of the maximum and minimum values of the different climatic elements, and of the variability and the fre-

quency of the individual values. Section 21 deals with the diurnal and annual variations of humidity, precipitation and cloudiness, and likewise gives within a very small compass a clear presentation of the types of these elements of climate. The influence of forests upon climate is very briefly summarized, and a compact statement is made as to the possible as well as the impossible ways in which man may regulate meteorological conditions which he finds unfavourable. We quote the following (p. 108): "Wind-breaks; protection against frost; to a limited extent protection against lightning; perhaps also the dissipation of fogs in harbours, are possible; while on the other hand the breaking up of hail and thunderstorms is to be counted among the impossibilities, as is the production of rain and of storms." This sentence at the same time furnishes an excellent example of the concise, direct style in which Dr. Köppen has written his whole book. We commend the little volume (costing but 80 pfennige, bound in linen!) to all who wish a shorter discussion of the principles of climatology than is contained in Hann's standard work, the *Handbook of Climatology*. R. DEC. W.

Die Haussasprache. Grammatik und systematisch geordnetes Wörterbuch: Haussa-deutsch-französisch-englisch. Von A. Seidel. xvi and 292 pp. Julius Groos, Verlag, Heidelberg, 1906. (Price, $1.)

A very convenient manual representing a distinct and worthy advance in the study of this great Hamitic speech of the western Sudan, a language which is widely used throughout a large region in Africa now coming more and more under settlement. In Mr. Seidel's project for the comprehension of this language this work occupies an intermediate position. It lies in proper position between the more detailed grammar of the Hausa and the great dictionary which he has now in hand. Pending the publication of these larger works, this manual must be considered only as it serves as an assistance to those who seek to acquire the language for immediate communication with the traders and soldiers of West Africa who use it. While in general the various phases of the old Ollendorff method are a trial to the systematic philologist, this should properly be commended for extreme simplicity. It formed the travelling diversion of the reviewer on two railway journeys, with the result that such study as was given to Seidel's work in the course of some twelve hours has resulted in an acquaintance with the tongue sufficient to serve for the opening of communication with the Hausa. On the other hand, it has the annoying defect of the method, in that one must be completely at a loss in case the Hausa should reply to a question in terms other than those set forth in the manual. Experience has taught every explorer that such a contingency is by no means unusual. In comparison with Robinson's work on this speech the advance made by Seidel clearly appears. In addition to the correction of errors made by Robinson, Schön and the few others who have laboured in this field, he has added in his grouped vocabularies a host of new terms. His treatment of the grammar is clear and easily comprehensible. A very valuable contribution is the employment of diacritical signs by which the pronunciation may be readily acquired, a matter that has hitherto been impossible save by ear. The vocabularies are presented in parallel columns of Hausa, German, French and English, a sensible recognition of the diversity of the European spheres of influence within which the language is used. Each of the European languages which appear in the vocabularies has its own grammatical sketch of the Hausa, forty-six pages in each case. In the English section of the grammar the name of the people is spelled after the German method as Haussa, but in the

vocabulary and on the English section of the title-page the preferred form of Hausa is employed. The slip is more than a little unfortunate, for with the pronunciation in all else so carefully indicated, it needs constant care to prevent being led astray by the doubled s into the adoption of a pure sibilant in the name of the people. W. C.

Le Guatemala économique. Par Charles H. Stephan. Chevalier et Rivière, Paris, 1907.

Well may the author of this book add to its title: "Practical and useful information." It is indeed a useful work, because it is, above all, practical. Besides, it is unpretentious. There is not a superfluous sentence, the style is strictly matter-of-fact, devoid of all decorative interpolations. Statistics do not crowd the text, but they are appropriately distributed and well selected. There is no branch of industry and commerce on which there is not a fair proportion of information imparted. The geography of Guatemala is treated in a concise way, rather by figures than in words, and only such parts of it as immediately concern the subject. Thus, the table of altitudes giving the lowest and highest limits at which culture plants can thrive is very full, whereas the general orography of Guatemala is disposed of in short but characteristic and appropriate statements. The climate receives due attention and in the same lucid and concise manner. We might, perhaps, have wished for more information on the condition of the inhabitants. What Bolivia is, ethnologically, in South America, Guatemala is north of the Equator. As in Bolivia, the Indians constitute about one-half of the people in numbers, the other half are mestizos and whites. In both countries, the aborigines form an absolutely peculiar, hence also economically interesting and important element, to which, in our opinion, the author might have devoted more space. The business man and the immigrant to Guatemala must count upon the Indian as a factor in the transactions of daily life, and hence the Indian's position and character should be made known to him. Topographically Guatemala resembles (on a smaller scale) Peru. Like Peru, Guatemala consists of three distinct zones, counting from west to east.

A slightly accidented, low land, densely wooded and with many watercourses; an elevated central plateau surmounted by a range of tall summits; a coast-zone, comparatively narrow and distinct from the western part of the country in that it is moist and covered with exuberant vegetation.

To the means of communication and transit Mr. Stephan naturally devotes much attention. They are quite primitive as yet in Guatemala, but he hopes for better times soon to come. The Pan-American railway is discussed quite extensively, the point of departure of that important enterprise being given by Mr. Stephan as Ayutla, on the northern confines of Guatemala. Of the feasibility of this project there is, according to Mr. Stephan, no doubt, in course of time.

We must also commend to the attention of the readers the extensive, almost exhaustive, treatment of the laws of Guatemala in respect to commerce, industry, and international relations. The remarks on educational conditions are brief and limited to technical instruction. It appears that Guatemala is, notwithstanding the large proportion of aboriginal blood represented in its population, and the long duration of specifically Indian rule in the past century, not so much behind other Spanish-American States; at least in number and variety of institutions. It is not in harmony with the usual spirit of thoroughness pervading the work to read: "After three centuries of Spanish rule this race (the Indians) had

been reduced to a tenth part of the population extant at the arrival of the first conquerors." A closer study of the sixteenth-century documents might be recommended to Mr. Stephan. No map accompanies the valuable book. A. F. B.

Hildreth's "Japan as it Was and Is." A Handbook of Old Japan. Edited with supplementary Notes by Ernest W. Clement, Introduction by Wm. Elliott Griffis. (2 vols.) Vol. I, xxx and 401 pp.; Vol. II, x and 388 pp.; 100 Illustrations, Maps, and Index. A. C. McClurg & Co., Chicago, 1906. (Price, $3.)

Richard Hildreth, well known as author of Hildreth's "History of the United States," first published his "Japan as it Was and Is" in 1855, and later editions were printed in 1856 and 1861. He never visited Japan, and the purpose of his book is simply to help the public to see the island empire as it appeared to successive visitors, from the European missionaries of the sixteenth century down to the time at which he wrote. He prepared the book when his countrymen knew very little of Japan and their interest in it had been awakened by the expedition of Commodore Perry. It was a helpful source of information, a compilation containing the cream of many volumes and copious quotations from them. It was not a consistent and digested account of Japan, for it showed that country through the eyes of practically all who had visited it and whose observations had been printed; nor was the author able to pass a critical judgment upon his material. Undoubtedly many erroneous views and contradictory opinions of the land and its people were expressed. Still, the book served a most useful purpose by placing before the general reader a conscientiously-prepared summary of Japan as it appeared to foreign visitors.

In a large sense the importance of the work has not diminished, in spite of the new and ever-growing literature on Japan. It will always be useful as a convenient and faithful compilation from all the important European writers on Old Japan. At the present time, however, the earlier editions of the work are not so serviceable as might be wished, because of the old-fashioned styles of transliteration that practically disguise many Japanese words and place-names.

Mr. Clement has performed a useful service in making the compilation thoroughly available for present reference purposes. His edition is not merely a reprint; it is a careful revision. It is supplied with many helpful notes, is finely illustrated, both with old Japanese prints and modern photographs, and the crude and inaccurate map in the original has been replaced with an entirely new map prepared to show Japan as it was during those days. Mr. Clement has been prominent in the educational life of Japan for the past twenty years, and no one is better qualified than he to make the improvements that appear in this fine edition of Hildreth's book.

Of course, the original title "Japan as it Was and Is" is retained, though it is not entirely suitable to a work which, written fifty years ago, reveals nothing of the modern regeneration of Japan. Mr. Clement's "Handbook of Modern Japan" supplements Hildreth's work, and the two together cover all of old and new Japan that is required by most readers. The index is excellent and the bibliography gives the most important works in English.